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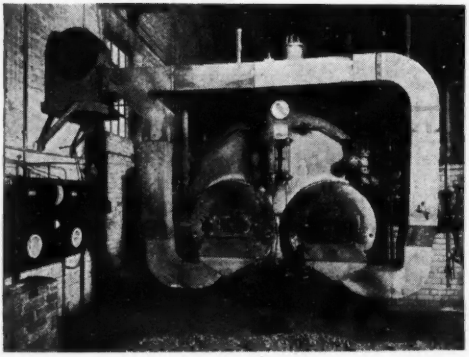

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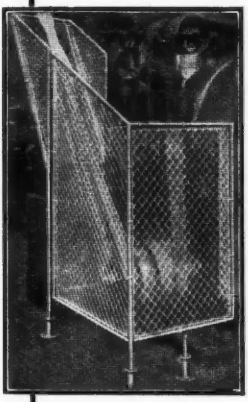

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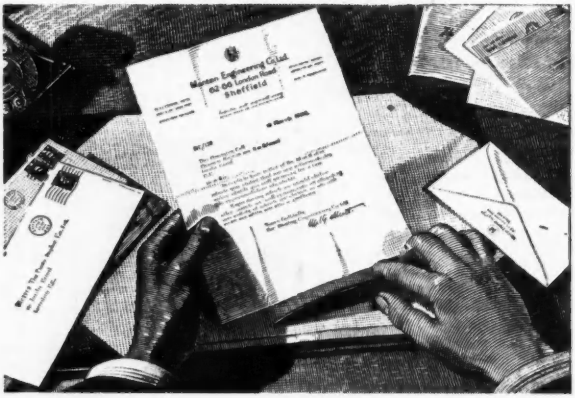

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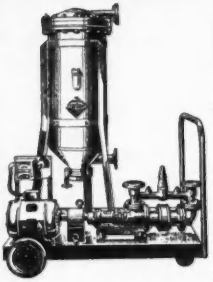

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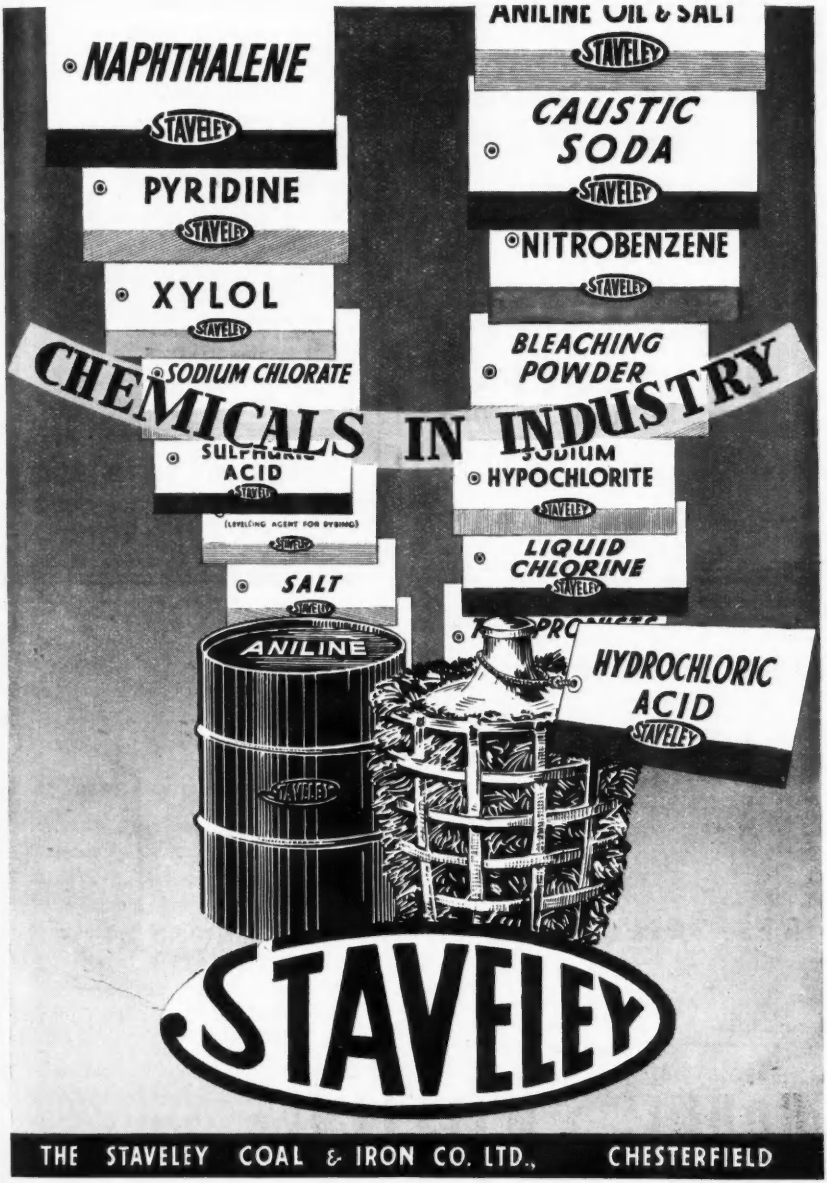

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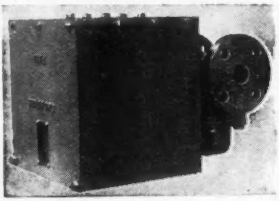

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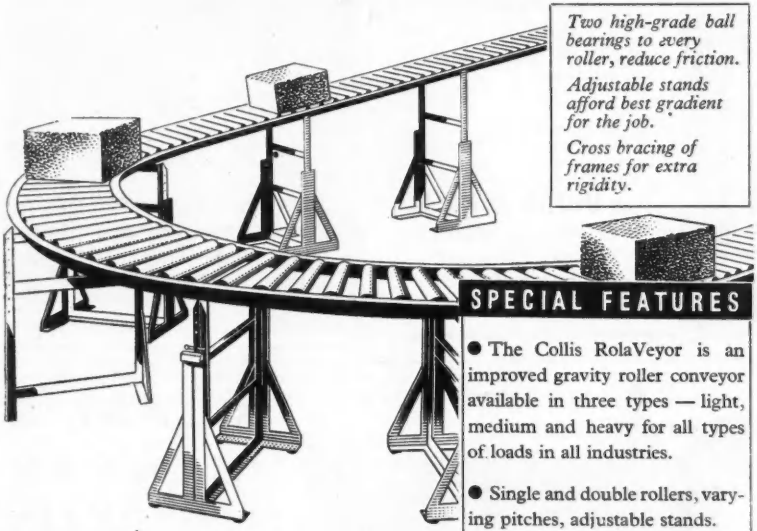

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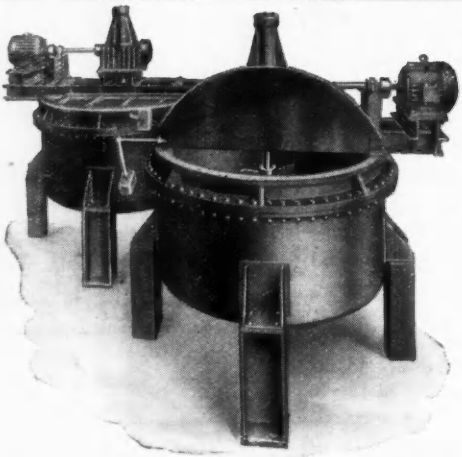

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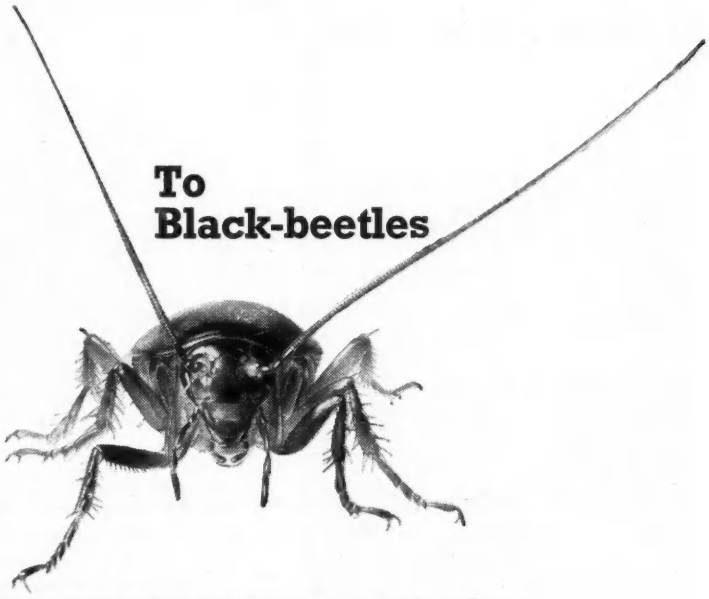

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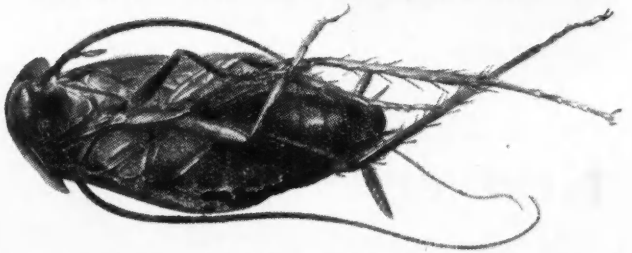

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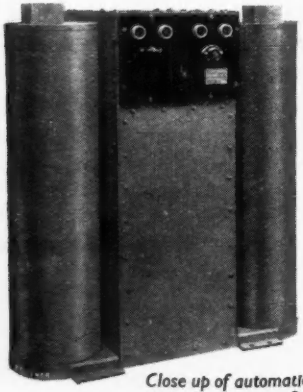

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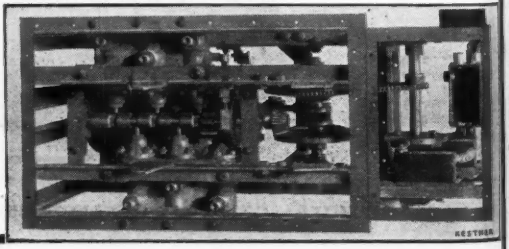

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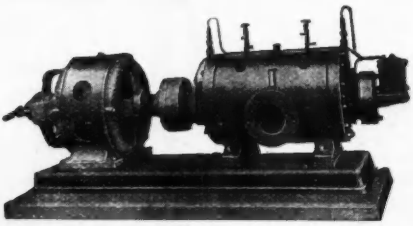

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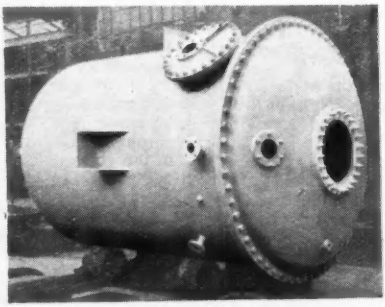

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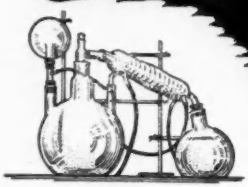

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Industrial Oxygen

SOME 50 years ago the Joule-Thomson effect was used by Linde to liquefy gases, representing yet another memorable example of a laboratory experiment apparently devoid of practical application that was to form the basis of great industrial enterprises. In the fullness of time this development enabled oxygen to be obtained by physical methods more refined and efficient than the original method of thermal decomposition of oxides or chlorates. Oxygen remained for many years an expensive commodity used in small quantities in medicine and in oxy-acetylene or oxy-coal-gas welding. The British Oxygen Company has done much in this country to establish the use of oxygen for a variety of purposes. The newer physical methods for oxygen production have been widely used in the industrial countries of the world and descriptions of the latest practice have been given in THE CHEMICAL AGE by Dr. Howat.

Notwithstanding all these developments, oxygen remained too expensive to be used liberally in industry for low-cost products. Certain possibilities have lately become evident, primarily connected with the fuel industries, but providing also synthesis gases for chemical reactions. Hints have come from America and Russia of cheaper oxygen. Really large quantities of oxygen can now be produced at a cost which encourages us to think that industrial oxygen will soon be sufficiently cheap to be used for gasification and combustion.

The use of oxygen in place of air in gasification plants may enable the gas producer and the water gas generator to be combined in a continuous plant in which the blast, consisting of a balanced mixture of water vapour and oxygen will generate a mixture of H_2 + CO free from nitrogen by a continuous process that may be of immense value in chemical synthesis, as Dr. Campbell has recently indicated.

The use of oxygen as blast in the blast furnace may speed production (thereby reducing costs) and yield as a by-product a richer gas free from nitrogen. In the open-hearth and other furnaces, the use of oxygen may well increase the rate of production, as it is now doing in the U.S.A., and increase thermal efficiency. The presence of nitrogen in furnaces leads to considerable thermal loss, for the nitrogen must be heated and carried through the furnace and up the chimney with waste of all the heat contained in it when it leaves the system.

There is more in it than that, of course. A recent experiment in which oxygen enriched air was used in a copper-melting furnace showed first a brighter flame and therefore presumably a greatly increased rate of heat transfer by radiation; second a shortening of the flame so that more fuel had to be burnt to fill the furnace with flame, *i.e.*, the heat release per unit of furnace volume was increased; and third, reduced heat losses in the waste gas.

Many, perhaps most, of our industrial furnaces have a low heat release per unit volume. This could be increased considerably by using oxygen with increase in the rate of production. It is an inter-

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esting fact that the volume of waste gas per unit of heat liberated at a given temperature is much less with oxygen than with air; therefore a furnace using oxygen begins in type to approach the electric furnace from which there are no products of combustion. It is freely predicted that the coming of industrial oxygen on a large scale may completely change the practice of design for all industrial furnaces.

These are some of the possibilities suggested by a recent discussion at the Institute of Fuel's January meeting in London which was initiated by a brilliant and provocative theoretical paper by Dr. Fehling. Chemical engineers and physicists have the most valuable incentives to reduce the cost of industrial oxygen sufficiently to allow its use for the purposes mentioned. It would plainly be uneconomic to produce oxygen at a central plant and to convey it by rail to the site of the furnaces or producers. What is needed is a plant to produce oxygen on the spot. The smaller volume of waste gas might well result in regenerators being made redundant, all hot waste gases being passed through waste heat boilers.

The steam generated in these boilers could be used to drive the compressors of the air liquefaction plant. Some such scheme was suggested by Dr. Fehling, who also showed that equilibrium between waste heat available and oxygen production involved the use of a degree of oxygen enrichment of the combustion air which varied from 60 per cent upwards, according to the fuel used.

Economics must enter largely into these possibilities—more largely than was suggested at the Institute's discussion. It is impossible at this stage to lay down any defined limits for the cost of oxygen because the cost that is permissible must depend on the monetary value of the advantages secured by the use of the oxygen. Then again, the cost of oxygen production will depend on the scale on which it is made.

Shall we or some later generation find oxygen piped over the industrial areas of towns as coal gas and water are piped to-day? It is not impossible. If the oxygen must be produced on site, the need will arise for mechanised, automatic oxygen production plant requiring little or no supervisory labour.

Quite a number of intriguing problems in plant design enter into the possibilities of industrial oxygen and these require the urgent attention of chemical engineers skilled in low temperature work. It is understood that the whole problem is to be discussed shortly by the low temperature section of the Physical Society. In the meantime, Dr. Fehling is to be congratulated on a very fine paper involving a vast amount of work which, when it is published, will surely rank among the classical papers of the subject.

NOTES AND COMMENTS

Atomic Risks and Rumours

THE resignation of Sir John Anderson, the chairman, and the winding up of the Advisory Committee on Atomic Energy is a logical step as nuclear physics attains the stature of a full-fledged science. That committee's terms of reference, however, entitled it to be at least a potential link between atomic science and more human affairs and in that connection its disappearance is regretted. The need for a window of some kind on the very private councils of the Ministry of Supply has long been apparent, notwithstanding the slightly more communicative policy of late, and in one particular aspect now being raised by the Chemical Workers' Union the need of wider publication is urgent. The union is alleging, not for the first time, that the health of workers in atomic energy plants is being exposed to special risks and it plans to secure the assistance of the T.U.C. in obliging the Government to institute particular safeguards. In the prevailing conditions of secrecy there is no means of judging how far these allegations are justified, and the conclusion of a special committee nearly a year ago that similar claims were " exaggerated " was not conclusive then or relevant now. A reflection of the general obscurity in which the entire subject is wrapped is the fact that most of the union's specific allegations are also " not for publication." If there is in fact a solid basis for these claims it is a public responsibility to see that everything is done to remedy the condition; if there is not, the consequences of the rumours will in one respect be as disastrous as if deadly risks were rife. Recruitment of workers for atomic energy experimental plants will diminish, perhaps cease.

Cost of Coal

THE rocket-like tendencies of coal prices since coal mines became national property have been a major factor in the inflation of production costs in heavy industry. Some of the reasons why the proverbial allusion to " black diamonds " has been disinterred with some approximation to the truth are set out by the National Coal Board in a sixpenny H.M.S.O. publication reviewing production costs in the first two quarters of 1947, the first six months of nationalisation. Total production costs in that period rose by approximately 4s. per ton, mainly because wage scales were higher and in the middle of the period the same amount was paid for five days' work as formerly was given for five-and-a-half. That is, of course, familiar ground, but the detailed review now presented fills in some of the background and reveals what were the chief contributory causes of the price spiral. In the first quarter, the 46,188,000 tons raised from the N.C.B. mines cost 37s. 11.4d. to produce, of which 24s. 9.8d. represented wages and the balance of slightly more than 13s. 1d. covered the other production costs, including depreciation and administration. In the second five-day-week quarter, the 45,850,000 tons raised was costing 40s. 5.2d. per ton to produce, of which 26s. 3.9d. went in wages and all other charges were correspondingly increased. Underground workers were then receiving, inclusive of allowances, 30s. 9.7d. per shift, against 28s. 8.4d. in the previous quarter. On these figures the N.C.B. is shown to have made a profit of 10.2d. per ton in the first quarter and in the second a loss of no less than of 1s. 7.5d. Since in the present accountancy no provision was made for interest on working capital borrowed from the Treasury or for payments to former colliery owners the profit made in the first three months seems to have been an illusory one and the loss in the second quarter was even more formidable. One thing most evident in this first balance sheet is that coal in future is fairly certain to cost more, unless the price is artificially controlled at the expense of the taxpayer. The other is that State coal mining will not pay, even at existing wage rates, unless miners' individual performances are very substantially improved.

America's Problem

TO the average Englishman, industrialist or chemist, the U.S.A. is apt to seem like another Aladdin's cave in which fuel and chemical raw materials, even if they do not grow on trees, are fairly readily available to all who have dollars. It is interesting to observe how widely this conception contrasts with the estimate of in-

dustrial prospects which is now increasingly widely accepted by farsighted individuals in American industry. To some at least there is a very palpable spectre at the banquet—the ghost of a petrol and fuel oil famine, which according to some authorities will have materialised in its grimmest form before the present generation has ceased to be interested. That well-founded warning has been the impetus behind the gigantic schemes for the conversion into "gasoline," oil, alcohol and chemicals of some of the great Pittsburg bituminous coal deposits, which in any estimation of the relative importance of industrial and chemical events in the U.S.A. in 1947 are likely to prove in the long run to have been by far the most significant. Even if one disregards the almost unintelligible millions of dollars which a group of coal, oil and chemical companies is preparing to spend on research and pilot plant this year and in establishing full-scale production of coal gas for synthesis in the next three, the fundamental importance of what is being planned is unmistakable. And if all the American plans come to fruition some benefits are fairly certain to accrue here—from the inevitable extension of science and technology, which a United Kingdom coal-oil industry could one day usefully employ, and from some easing of the scramble for petroleum, to the benefit of the refinery and oil-chemical production industries projected here.

Statistics and Research

STATISTICAL science and practice have made great advances in recent years and long ago falsified the common gibe that figures can prove anything. In market research and production budgeting they have proved invaluable when properly used in skilful and experienced hands. Their application in scientific research is somewhat more complex and opens up a comparatively new field of applied statistics, one of profound interest and importance, and requiring new technique and methods. That need has been realised both in this country and in the U.S.A. In the latter, a relatively new approach will be incorporated in the University of Delaware extra-mural course, to be offered in Wilmington in 1948, under the direction of George E. Hulse, of the Hercules Powder Company on application of statistical methods to design of experiments and analysis of data. In this country, Imperial Chemical Industries, Ltd., has recently had published by Oliver & Boyd, of London and Edinburgh, a book on "Statistical Methods in Research and Production" with special reference to the chemical industry: (286 pp. + xii and index). In a foreword Lord McGowan says this is the first of a series of scientific and technical handbooks which I.C.I. intends to publish, with the aim of making generally available the important body of information accumulated as a result of the company's manufacturing experience and research. The book is the work of several contributors under the editorship of Dr. Owen L. Davies. For some years statistical experts have been engaged by the company and this handbook represents the result of their experience. Acknowledgment is made to I.C.I., Ltd., and its staff, to the Biometrika Trust, and the British Standards Institution. The subjects dealt with include: frequency distribution, averages and measures of dispersion, tests of significance analysis of variance, regression and correlation, frequency data and contingency tables, etc., with glossary of terms and notes on mathematical expression. It is a somewhat advanced work and appears to be the only one bringing together the chief applications of statistical method to chemical industry and experiment with special application to chemical research.

FUTURE OF PHARMACISTS' COLLEGE

THE Pharmaceutical Society of Great Britain has decided that the steady rise in costs and salaries makes it impossible for them to continue to maintain their college as they have done since it was founded in 1842. After consultation with the University of London, they therefore propose that the college should become an independent corporate body governed by a council including representatives of the society, the university, the academic staff, and the pharmaceutical profession and industry. The college would remain a "school" of the university.

The society and the university are now discussing a proposal that the latter should take over the building in Brunswick Square intended to house the college, on which the society have already spent £200,000 and which would need as much to complete.

Chemical Output in October—November

Additions to the Labour Force Continue

DURING October, 1947, the number of persons engaged in the production of chemicals, explosives, paints, oils, etc., rose from 353,100 to 356,000, according to the December issue of the *Monthly Digest of Statistics*, published by H.M.S.O. The tempo of recruitment has therefore slightly accelerated since the Ministry of Labour commenced to give monthly figures at the end of August. Although by far the greater proportion of workers is shown as being employed on orders for the home market and supply departments (284,800), the bulk of the new labour seems to have been thrown into the export drive—71,200 were engaged on exports in October as against only 68,800 in September.

Owing to the incompleteness of the figures supplied—some are complete to November, and others only to October or even September—it is not always possible to draw definite comparisons in relation to production and stocks. With regard to consumption, there appears, however, to have been a tendency for general increases, which may be accounted for by the export drive and the greater number of persons engaged upon that work.

CHEMICAL PRODUCTION AND USES—OCTOBER AND NOVEMBER

	November, 1947 Thousand tons			November, 1946 Thousand tons		
	Production	Consumption	Stocks	Production	Consumption	Stocks
Sulphuric acid	120.7	127†	57.3	113.7	116	53.1
Sulphur	—	20.6	55.1	—	24.8	50.2
Pyrites	—	17.9	67	—	16.5	57
Spent oxide	—	15.8	161	—	14.9	145.9
Molasses†	31.5	35.7*	183.2	48.1	38.5*	123.1
Industrial alcohol† (million bulk gal.) ...	2.41	3.29	8.05	2.64	2.50	1.74
Superphosphate	°	°	°	75.5	72.4	140.7
Compound fertilisers†	152.3	117.9	192.8	97.5	76.3	277.1
Agricultural lime†	—	467.2	—	—	306.2	—
Ammonia (weekly average)	—	6.05	°	—	5.77	4.12
Phosphate rock (agricultural)†	—	73.7	119.8	—	60.9	135.9
Phosphate rock (industrial)†	—	5.0	39.4	—	4.57	33.0
Virgin aluminium	2.42	16.9	—	2.40	12.9	—
Magnesium	°	°	—	0.20	0.18	—
Virgin copper†	—	38.4	104.4	—	32.0	86.6
Virgin zinc†	—	21.5	33.7	—	20.4	38.4
Refined lead†	—	19.3	39.3	—	17.8	26.7
Tin†	—	2.88	15.6	—	2.64	21.3
Zinc concentrates†	—	14.7	65	—	14.6	104.0

* Distilling only †October ° Not yet available

SOCIETY OF LEATHER TRADES' CHEMISTS

Formation of Autonomous National Societies Arranged

FOLLOWING a recent ballot of members of the International Society of Leather Trades' Chemists, the executive committee arranged for the dissolution of the International Society as from December 31, 1947, and for the formation of autonomous national societies in place of the national sections then existing.

The Australian, British, General, Indian and South African Sections of the old I.S.L.T.C. will now form the new Society of Leather Trades' Chemists. It is proposed that the new society will become a founder-member of the new International Union of Leather Chemists Societies which is now being organised, to continue co-operation with other national societies. The new arrangement will greatly facilitate the administration of the society, and it is hoped that it will, by virtue of being responsible for its own management, be able to play an increasingly useful part in the leather trade here and in the Dominions.

The officers and committee of the Society of Leather Trades' Chemists for 1948 are: President, N. L. Holmes; vice-president, G. J. Cutbush; second vice-president, F. H. Quinn; hon. treasurer, D. Burton; hon. sec., G. H. W. Humphreys; committee: W. R. Atkin, R. Denyer, G. W. Douglas, F. E. Eyre, F. W. Hancock, K. G. A. Pankhurst; editor of the journal, A. Harvey.

The journal will continue to be published as hitherto, and all communications relating to the journal and library should be addressed to the Editor, "Craigieburn," Duppas Hill Road, Croydon, Surrey, the editorial office and library of the society. Other communications should be addressed to the secretary, Mr. G. H. W. Humphreys, Forestal Central Laboratories, Harpenden.

Soviet Russia's Aluminium Totals

Possible 200,000 Tons Annually

IN view of the paucity of facts and figures about the development of individual industries in the Soviet Union—especially if they are of strategic importance—the following account of the development of the Soviet Russian aluminium industry, based on an article published in the French Journal *Revue de l'Aluminium*, Paris, appears to cover new ground.

The first Soviet aluminium plant was established at Volchov (some 130 kilometres east of Leningrad) in 1932, a venture in which French experts co-operated. The annual capacity of this plant aggregated about 10,000 tons of crude aluminium. Two years later, building work was started on a second plant at Zaporozhe on the Lower Dnieper in the Ukraine, with an annual capacity of 20,000 metric tons per annum.

In September, 1939, production was started in a third plant situated in Kamensk in the Ural Mountains, with an annual capacity of 25,000 metric tons. The two other works were expanded at the same time and it is stated that at the time of the German invasion of the U.S.S.R., in 1941, total productive capacity amounted annually to about 65,000 to 70,000 metric tons of crude aluminium.

Withdrawal to the East

In spite of the rapid advances made by the Germans, the Soviet authorities succeeded in removing a considerable part of the Volchov and Zaporezhe plants to the East where they were reassembled. It was also decided to expand the new works in Kamensk in the Urals. In 1942, new plants were erected in Stalinsk (in the Kuzbaz region of Western Siberia) and in Krasnotourinsk (Bogoslovsk) in the western part of the Central Urals. By these measures it was possible to compensate for the loss of plants in German-occupied Russia. Output, which had fallen to about 57,000 metric tons in 1942, is stated to have aggregated some 70,000 metric tons in 1945. This was, of course, insufficient for war needs and imports (in metric tons) are reported to have totalled 135,000 in 1944, of which the U.S.A. supplied 115,400, and Canada 19,100.

Quick Recovery

The current Five-Year Plan envisages a total output of about 120,000 tons by 1950, *i.e.*, twice the pre-war figure. It is thought, however, that this figure has already been reached. This assumption is based on the fact that the Volchov works were rebuilt immediately the Germans had been driven out, and output last autumn is said to have totalled 10,000 tons.

Reconstruction work is in progress in the Zaporozhe works and it is hoped to complete it by the middle of 1948. The total capacity of the plants which were erected during the war is estimated at around 150,000 tons. To this figure has to be added 60,000 tons, representing the productive capacity of a plant in Saxony which was dismantled in 1945 and removed to the U.S.S.R. It appears, therefore, that the present capacity of the Soviet Russian aluminum industry amounts to approximately 200,000 metric tons per annum.

SETBACK IN GERMAN CHEMICAL PRODUCTION

REVIEWING German industrial production for 1947 in the Canadian Government publication *Foreign Trade* (December 20, 1947), Mr. D. W. Jackson, Canadian Economic Representative in the U.S. zone, states that in September last year, industrial production in the zone fell by 5 per cent compared with figures for earlier months of the year.

The most serious factor in this production drop was in the field of chemicals. Production of calcium carbide, the largest single item, dropped from 14,000 tons in August to 7500 tons in September, entirely as a result of its dependence on hydro-electric power. Cyanamid production, which is dependent upon the supply of calcium carbide, fell even more severely, from 150,000 tons to less than 3300 tons. The shortage of waterpower and coal also curtailed production of caustic soda and soap. Paints, varnishes, and lacquers fell off by almost 12 per cent because of the critical shortage of drying oil, which must be imported.

On the other hand, production of dyestuffs and sulphuric acid rose moderately, though not enough to balance the declines. Taken as a whole, chemical production fell from 52 to 37 per cent of its 1936 level. An increase of one fourth in the bizonal allocation of coal to the chemical industry for October is expected to have a healthy effect upon production figures for that month. Their publication is awaited.

MODEL SAFETY RULES

WIDENED SCOPE OF CURRENT A.B.C.M. PUBLICATION

THE importance of safety measures in the protection of life and property at all works where chemicals are handled cannot be stressed too highly. Twenty years ago the Council of the Association of British Chemical Manufacturers first decided to prepare a set of "Model Safety Rules for use in Chemical Works," and to issue them to members of the association for guidance. Such was the genesis of the A.B.C.M. publication, of which the third edition of Part 1* has now made its appearance.

The task of compiling these rules was originally taken in hand by a Works Technical Committee, and the result was published in provisional form in 1929, followed in 1930 by a further publication which dealt with the particular risks of fire and explosion, which, as obvious hazards of chemical works, first claimed more detailed attention.

A second edition of all this valuable information appeared in 1938, when it was possible to make various amendments and additions which were suggested by experience during the preceding nine years, and to take into account the provisions of the then recent Factories Act, 1937.

Changed Technology

Since 1938 there have been far-reaching advances in chemical technology. The revision of Part 1 of "Safety Rules for Use in Chemical Works" was therefore taken in hand by a new Works Safety Committee appointed in 1946. On this occasion the Association of British Chemical Manufacturers and the Association of Chemical and Allied Employers co-operated, the former being concerned with safety in its technical aspects and the latter dealing with personnel and welfare matters.

At first glance, this third edition is a little confusing with its numerous marginal headings and inserted references to the relative sections of the Factories Act, 1937, and Chemical Works Regulations, 1922 (S. R. & O., 1922, No. 731). A more detailed perusal, however, shows that it presents the really important points of a wealth of information which demand most careful consideration by all who are concerned with operations at chemical and allied works, either in administrative capacity or as actual workers.

The present publication, presenting 33 pages of actual text (the remainder including sectional headings and a number of blank pages for the user's own notes), is concerned with a concise statement of the principles of works safety, and, as hitherto, is to be followed by other publications giving "detailed instructions."

The subject is conveniently treated in nine sections, which, apart from general considerations, cover rules for the design, operation and maintenance of plant having fire and explosion risks; rules concerning plant where there are hazards from gas, vapour, fume or dust; rules for plant involving possible contact with corrosive substances; other risks, such as slipping or falling, or particularly concerning injury to the eyes; fire protection; industrial health services; the welfare of employees; and such special matters as concern the employment of women and young persons.

"Post-Graduate Course"

The information is occasionally a matter of commonsense, at other times the fruit of highly specialised experience; the whole undoubtedly deserves the careful attention of all concerned. Few readers, perhaps, will be entirely unfamiliar with the rules to be observed, the risks which were present, the precautions to be taken; the present method of presenting the facts proves admirable as a sort of post-graduate course for those who already know, and equally as a means for properly educating the uninformed.

Our own experience of conditions at many works throughout the country where chemicals are handled prompts the suggestion that a careful and conscientious reading of this new third edition of Safety Rules will do much to improve matters. It should reduce the present incidence of accidents, which in chemical works are indeed surprisingly low in number, considering the common hazardous nature of so many chemicals and chemical reactions, not forgetting the human element of forgetfulness or negligence.

By means of the marginal notes throughout, the reader is constantly reminded of the provisions of the law in relation to the various aspects of safety which are outlined. The only criticism we have to make is that the publication as a whole, even considering its compact form, does really suffer from the lack of an index; it is true that the contents of each section are separately set out throughout, but even so a very full index under all possible subjects would make these Safety Rules still more accessible and useful.

(*Continued overleaf*)

* Safety Rules for Use in Chemical Works. Part 1. Model Rules, 3rd edition, p. 72. London: Association of British Chemical Manufacturers, 1947.

Tin Prices Increased

Bolivian and Nigerian Grades

THE Ministry of Supply announces that in consequence of the recent settlement of the price for Bolivian tin, the following adjustments in the price of tin metal in the U.K. have been made :—

Minimum 99 per cent up to under 99.75 per cent tin content, from £510 to £519 per ton f.o.b. U.K. port or delivered U.K. consumer's works. Other grades are correspondingly varied as follows :—

Refined tin 99.75 per cent minimum from £513 10s. to £522 10s.; refined tin 99.9 per cent minimum (in 28 lb. ingots) from £518 to £527; grain bar tin, from £530 to £539; granulated tin from £535 to £544. The customary extras for small lots, packing, etc., will remain.

Consequent upon the increase in the sum to be paid for Bolivian tin, the Ministry has also adjusted the purchase price of Nigerian ore from £477 to £485 10s. per ton of tin in ore f.a.s. Nigerian port. All inquiries should be addressed to the Directorate of Non-Ferrous Metals, 20 Albert Street, Rugby (Rugby 2131).

National tin stocks underwent little change during November. This is indicated in the Ministry of Supply's monthly survey, just issued. Tin stocks on November 1 amounted to 6438 tons held by the Ministry and 2708 held by consumers. At the end of the month the equivalent figures were 6326 and 2798 tons. Production during the month is stated to have amounted to 2603 tons, 2602 tons were delivered to consumers and 113 tons exported.

German Patents

Swedish Government to Arrange Sale

THE Swedish Government announces that its Foreign Capital Control Office is arranging the sale of 267 German patents, about half of which are at present being used by Swedish industry. Among the list of 87 classified headings, appear the following :—Mining; bleaching, washing, dyeing, and finishing; chemical processes and apparatus; production of fertilisers, fertilising processes, and chemical treatment of soil; production of iron; production of gas by gasification of fuel; production of non-ferrous metals; chemical treatment of metals and clay products, stone, lime, cement, gypsum, and asphalt. It is announced that among the as yet unexploited patents are a number of chemical production methods and formulæ from Merck.

The above information which is given in the *Board of Trade Journal*, January 10, requests prospective buyers to submit bids in writing direct to the Foreign Capital Control Office (Flyktkapitalbyran), Hovslagargatan 2, Stockholm, by March 15, at the same time sending copies to the Board of Trade, Export Promotion Department, 35 Old Queen Street, S.W.1. Bankers should be consulted as to the availability of foreign exchange.

Coal Production Drops.—Last week's coal production amounted to 4,059,000 tons, the lowest of any full week since the week ended October 25. It nevertheless compares favourably with the corresponding week of last year (3,905,600 tons).

MODEL SAFETY RULES (*contd. from overleaf*)

The scope of the information conveyed in these Safety Rules, may be represented by a few examples : we are reminded, and not unnecessarily, that "*before commencing any large-scale experimental work or any new manufacture, the employer shall take steps to ascertain definitely all the hazards involved both from the actual operations and the chemical reactions.*"

Subsequent paragraphs concern fire resistance of buildings, means of escape, dangers of ignition, static electricity, provision of heat for the process, escape of hazardous vapours, removal of dust, and leakage of dangerous liquids, with stress laid on aspects such as this : "*Possible leakages from vessels containing inflammable or dangerous liquids shall be confined by means of bund walls, sumps, etc., and the surrounding area and drains protected from contamination.*"

Many similar details are given upon particular matters which need to be stressed. Special attention is drawn to the necessity of making provision for controlling the effects of unduly vigorous or delayed reactions : "*In these cases provision shall be made as far as possible for automatic and distant control, and for automatic flooding or blanketing (e.g., by a foam approved for fire extinction) in the even of an accident.*" The dismantling of plant, removal of deposits during maintenance, and frost protection are dealt in turn. Special care is required in breaking joints in pipe lines which have carried inflammable liquid or vapour. Deposits have to be removed at the earliest opportunity. "*Care shall be taken to prevent the occurrence of fire or explosion due to the too forcible removal of such deposits, e.g., in pipe lines or other places, by metal tools, heated metal wire or external heating (other than by means of steam or hot water).*"

On every one of these 32 pages there are points essential to the continued reduction of accidents.

Chrome Ore Prices

New Schedule Announced

THE Ministry of Supply announces that the following selling prices for chrome, which include carriage charges to the consumer's nearest rail point, will apply for despatches as from January 1.

	Per ton Ex Ship £ s. d.	Per ton Ex Store £ s. d.
REFRACTORY GRADES:		
Rhodesian Imperial grade ...	9 18 6	11 1 0
Transvaal, 1st grade (basis, 42 per cent., scale 1s. 6d.)	7 17 6	8 19 0
Indian (basis 40 per cent., scale 1s. 6d.	9 2 6	10 4 0
Turkish, grade I	9 12 6	10 15 0
Philippine	7 11 0	8 13 0
METALLURGICAL GRADES		
Rhodesian lumpy metallurgical	10 0 0	11 2 0
Baluchistan	10 7 6	11 9 0
Rhodesian washed concentrates	10 4 0	11 9 6
CHEMICAL GRADES:		
Rhodesian Dyke chemical ...	10 0 0	11 1 6
Transvaal chemical A grade concentrates (basis 48 per cent., scale 2s. 6d.) ...	9 12 0	10 17 0
Transvaal B grade (basis 48 per cent., scale 2s. 6d.)	9 6 0	10 11 0
Transvaal C grade (basis 46 per cent., scale 2s. 6d.	8 19 0	10 4 0
Transvaal D grade (basis 44 per cent., scale 1s. 6d.)	7 16 0	9 1 0
Baluchistan	10 7 6	11 9 0

BRAKE ON EXPORTS

SIR Stafford Cripps' recent statement urging industry to reduce manufacturing costs, produced a reply from ten trade organisations, among whom were included the paint and rubber manufacturers, on whose behalf a spokesman said:—

"Sir Stafford is already aware of the extent to which the industries using light hydro-carbon oils are penalised by the application of the petrol tax of 9d. per gallon to the manufacturing costs of their products.

"It is hoped that the Chancellor of the Exchequer will, by abolishing the tax, assist the efforts of the industry to achieve a reduction of costs which will enable the export targets to be reached."

FERTILISER MARKET IN 1948

ACCORDING to the annual report of the Lautaro Nitrate Co., which held its annual general meeting in Santiago on December 31, the substantial demand for nitrogen fertiliser in world markets is expected to continue during the current year.

All nitrate and iodine sales were effected through the Chilean Nitrate and Iodine Sales Corporation, and the company's quota in sales for 1946-47 was 542,145 metric tons of nitrate and 493,298 metric kilos of iodine respectively, against 579,885 metric tons and 264,585 kilos for 1945-46.

Glass Research Urged

Working Party Submits Report

AMONG recommendations contained in a report by the Working Party set up to investigate conditions in the hand-blown domestic glassware industry, is a suggestion that consideration should be given to the establishment of a Design Centre with the support of the entire glass industry. It is urged that a glass research association be formed, financial support being obtained from the industry and the Department of Scientific and Industrial Research.

The hand-blown section of the industry, the report recommends, should make every effort to develop and extend technical research work at its own factories. Other suggestions include the setting up of a fully representative trade association, followed by a reconstitution of the Joint Consultative Council.

Appended to the report are excerpts from notes made by the Working Party delegations which visited the U.S.A. and Sweden.

ELEMENTS FROM URANIUM

IN the course of an address to a meeting of the American Physical Society at Los Angeles, Dr. Glenn T. Seaborg, professor of chemistry at the University of California, said that in one "bombardment" in a cyclotron, uranium was transmuted into no less than two-thirds of all the known elements. Transmutation, he said was accomplished by two reactions: fission (for the atomic bomb), and "chipping" off parts of the atom to change its essential nature.

In the latter reaction, said Dr. Seaborg, the University of California's cyclotron had "chipped" off as many as 30 nuclear pieces compared with a maximum of six elsewhere. It was then discovered that the bismuth atom splits at a far greater speed than the uranium atom, the respective times being indicated by a fraction of a second represented by 10 with 18 following zeros, and 10 with 15 zeros.

£15 MILLION FROM SEAWEED

THE development of a chemical industry worth £15,000,000 annually was possible in Scotland using seaweed as a raw material, Sir Steven Bilsland told visitors at the recent opening of a "Seaweed Harvest" exhibition in Edinburgh. Of this income 90 per cent would be spent in Scotland and 33 per cent be paid to collectors. The Seaweed Research Association, of Musselburgh, now responsible for the exploitation of seaweed had a considerable programme of survey and research on hand.

CHEMICAL PRODUCTS OF COAL CARBONISATION—III

Rich Yields of Plastics and Coal-Tar Derivatives

by JOHN R. CAMPBELL B.Sc., Ph.D., A.R.T.C., F.R.I.C.

CHLORINATION of ethylene has led to some very remarkable developments. Direct chlorination yields vinyl chloride

$CH_2 = CH_2 + Cl_2 \rightarrow CH_2 = CHCl + HCl$

a substance which is the basis of the polyvinyl chloride (PVC) resins, a group which covers the entire thermoplastic range, from hard-moulding resins to tough, flexible products. The versatility of the applications of these plastic materials, developed largely during the war and to an even greater extent in the post-war period has made them almost an all-purpose product. These plastic substances are made up of long chains of polyvinyl chloride groups thus :—

$—CH_2—CHCl—CH_2—CHCl—CH_2—CHCl— \ldots$

Replacement of two of the hydrogen atoms in ethylene by chlorine produces the compound vinylidine chloride

$CH_2=CH_2+2Cl_2 \rightarrow CH_2=CCl_2+2HCl$

an unsymmetrical dichloro-ethylene which can polymerise by itself or with other monomers to give co-polymers which range in properties from hard, tough, thermoplastic substances to very flexible materials.

It is interesting to note that the polyvinylidine resins have been known for over a century but their commercial development was not realised until 1939. Since then they have found extensive use as surface coatings, tubes and rods, insulators, films and as filament fibres. The co-polymerisation of PVC and polyvinylidine chloride gave the impetus to an examination of the co-polymerisation of other plastic-forming substances with these monomers and the range of products is now very extensive.

Direct addition of chlorine to ethylene yields ethylene dichloride :—

$CH_2=CH_2+Cl_2 \rightarrow CH_2Cl.CH_2Cl$

which, when treated with sodium polysulphide gives rise to thiokol

$$CH_2Cl.\ CH_2Cl + Na—S—S—Na \rightarrow$$

$$\rightarrow \quad —C(H)(H)—C(H)(H)—S—S— \quad + 2\ NaCl$$

thiokol unit,

the thiokol unit polymerising to give a rubbery-like material superior to rubber in many respects, especially in its remarkable resistance to chemical reagents and, in particular, to oils. In recent years thiokol has found extensive application in tubing and hose of all sizes for the conveyance of petrol and fuel oils.

Polystyrene Plastics

By reaction with hydrochloric acid, ethylene produces ethyl chloride

$CH_2=CH_2+HCl \rightarrow CH_3.CH_2Cl$

which is extensively used in the preparation of ethyl cellulose, a plastic material largely used in the manufacture of adhesives, insulators for low temperature work, lacquers and films.

Ethylene reacts with benzene to yield ethyl benzene

$CH_2=CH_2+C_6H_6 \rightarrow C_6H_5.CH_2.CH_3$

which is easily dehydrogenated to give vinyl benzene or styrene

$C_6H_5.CH_2.CH_3 \rightarrow C_6H_5.CH=CH_2 + H_2$

the starting point in the production of the polystyrene plastics.

These substances possess an excellent resistance to moisture and to chemicals generally and are also good electrical insulators. Polystyrene is not exactly a new product, a patent for its use as an insulator having been recorded in 1911, but manufacture of the substance was not commenced until 1937. During the war enormous quantities became available for war purposes.

Acrylic Acid Products

Another type of plastic material which has extensive applications is that based on acrylic acid. Acrylic acid can be prepared from ethylene first of all by conversion to the cyanhydrin by the addition of cyanic acid.

$CH_2=CH_2+HOCN \rightarrow CH_2OH.CH_2CN.$

Dehydration of the cyanhydrin yields acrylonitrile

$CH_2OH.CH_2CN \rightarrow CH_2=CHCN+H_2O$

which, in turn, is easily hydrolysed to give acrylic acid,

$CH_2=CHCN+2H_2O \rightarrow CH_2=CH.COOH+\cdot N_3H$

Conversion of the free acid into the methyl ester or the preparation of the methyl ester of methacrylic acid—$CH_2=C(CH_3).COOH$—by other means furnishes the two starting materials for this type of plastic substances which range from soft, tacky, semi-fluids to hard, tough, thermoplastic products characterised by their light weight, high transparency, remarkable optical properties and the ease with which they can be machined.

Previous parts of this paper appeared on pp. 820—22 (lvii), and 12—14 (lviii).

In view of the unique property of polymethyl methacrylate resins in being able to "pipe" light round corners, they have been extensively used in illuminating signs and displays but they are also largely employed in the manufacture of dentures, and for aeroplane covers, for which their weather resistance and shatterproof properties render them eminently suitable. The well-known perspex is a member of this class of plastic material.

In other branches of the organic chemical industry, ethylene finds application as an alkylation agent; on hydration it gives ethyl alcohol, while when fluorinated it gives rise to refrigerants of the Freon type, as well as a new group of plastics. By way of di- and tri-ethanolamine, ethylene is converted into materials of the nature of soaps.

Propylene and Butylene

The field for utilisation of propylene still awaits further development, but since propylene is the most abundant of the olefin gases in natural gas, it is reasonable to expect that these developments will soon take place in America. Nevertheless, considerable work has been accomplished in the use of propylene in organic synthesis, principally in the field of oxygenated derivatives, some of which have been used to a considerable extent in the plastics industry.

Perhaps the most important property of propylene, in addition to its reactivity, is the fact that it contains three carbon atoms and therefore furnishes a starting material for the manufacture of compounds containing that number of carbon atoms.

Probably the most common derivative of propylene is acetone which is prepared by the dehydrogenation of isopropyl alcohol, a substance important in its own right, formed by the hydration of propylene

$$\begin{array}{ccccccc} CH_2 & & CH_3 & & CH_3 \\ \| & & | & & | \\ CH & \xrightarrow{H_2O} & CHOH & \xrightarrow{-H_2} & CO \\ | & & | & & | \\ CH_2 & & CH_3 & & CH_3 \end{array}$$

Acetone finds many applications, particularly as a solvent, as a source of acetic acid and acetic anhydride and also is an intermediate in the manufacture of the methyl methacrylate polymers to which reference has already been made. Acetone is converted into the cyanhydrin, which then reacts with methyl alcohol to give the ester methyl methacrylate, which is the monomer yielding the plastics on polymerisation:—

$$CH_3.CO.CH_3 \xrightarrow{HCN} CH_3.C(OH)CN.CH_3$$

$$\xrightarrow{CH_3OH} CH_2=C(CH_3).COOCH_3 + NH_3$$

By chlorination, followed by hydrolysis, propylene furnishes a means of synthesising glycerol, which is normally a by-product of the soap industry:—

$$\begin{array}{ccccccc} CH_3 & & CH_2Cl & & CH_2OH \\ | & & | & & | \\ CH & \xrightarrow{Cl_2} & CHCl & \xrightarrow{H_2O} & CHOH \\ \| & & | & & | \\ CH_2 & & CH_2Cl & & CH_2OH \end{array}$$

and is now an intermediate in the production of the alkyd or glyptal resins, formed by the reaction of polyhydric alcohols such as glycerol with polybasic acids like phthalic, succinic and tartaric acids, and which find application as paints, undercoatings, varnishes, lacquers, etc., usually after modification with other synthetic resins. In one form or another, these resins furnish at least half of the total requirements for protective coatings.

The potential applications of propylene to the plastics industries appear to be no less extensive than those of ethylene and a new type of thermosetting resin, the allyl resins, has recently been manufactured by the reaction between allyl alcohol (from propylene) with dibasic acids with or without the addition of such substances as glycol and styrene. Similarly, the polymerisation of methyl styrene (from propylene) follows the lines of that of styrene (from ethylene).

Butylene Rubbers

The small quantities of butylene present in coal gas preclude any great development of this olefin in this country from that source, at least on anything approaching the scale on which it has been carried out in America, but if small quantities are isolated, these could be used for many purposes.

By far the largest application of butylene in the immediate past has been in the preparation of synthetic rubbers, most of which are polymers based on a unit containing four carbon atoms and a double bond, *e.g.*,

Buna 85 $[-CH_2-CH=CH-CH_2-]_n$

Buna S $[-(-CH_2-CH=CH-CH_2-)_x-CH_2-CH.C_6H_5]_n$

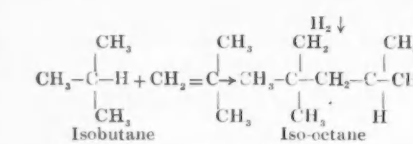
Perbunan $[-(-CH_2-CH=CH-CH_2-)_x-CH_2-CHCN]_n$

Neoprene $[-CH_2=CCl-CH=CH_2]_n$

Butyl rubber $[-(-CH_2-C(CH_3)_2-)_x-CH_2-CH=CH-CH_2-]_n$

An important field of application of the butylenes is in the manufacture of synthetic liquid fuels of high octane values. The relationship between iso-butylene and iso-octane and iso-octene is shown by the equations.—

$$\underset{\text{Isobutylene}}{CH_2=C(CH_3)_2} + CH_2=C(CH_3)_2 \rightarrow \underset{\text{iso-octene}}{CH_3-C(CH_3)_2-CH_2-C(CH_3)=CH_2}$$



Isobutane Iso-octane

Hydrogenation of iso-octene then produces iso-octane, a process of the greatest importance in the manufacture of 100-octane aviation fuel.

In addition to these possibilities, the application of butylene to plastics production could be made, although the same variety of products does not appear to be possible with the butylenes as with the lower olefins, owing to the inherent rubbery nature of the polymers produced.

Coal Tar

Although coal tar is generally passed on from the coal carbonising industry to the tar distiller for refining, it is as well for the gas and coke manufacturer to know something of the developments which have taken place in the utilisation of this material.

The coal tar produced by high temperature carbonisation has been for long regarded as a fruitful source of many aromatic intermediate compounds for the dyestuffs and pharmaceutical industries.

Before the war, practically all the benzole produced in this country was obtained by the distillation of coal tar, but modern technique, governed largely by war-time requirements of benzole, has developed to such an extent that to-day a larger proportion is recovered from carbonisation gases than from tar distillation. It is of interest to note that the annual production of crude benzole in the United Kingdom is approaching 100 million gallons.

In Scotland, the tar distillation industry, now handling some 206,000 tons annually, may be considered to have originated with Lord Dundonald's process which was patented in 1781. In 1845, almost synchronising with Hofmann's work on the isolation of benzene from light tar oils, James Ross commenced the manufacture of boiled tar in Falkirk, the local shipbuilding industry absorbing most of the products. Several other firms followed and by the end of the nineteenth century all were absorbed under the title of the Scottish Tar Distillers which now treats over 75 per cent of the crude tar produced in Scotland, excluding the production of Glasgow Corporation.

Newer Uses

Possibly the greatest single development in the processing of crude tar was the introduction of the Wilton pipe still which was the forerunner of the modern pipe still. Three stills of this type are in use in the Scottish tar industry, enabling the distillation to be carried to pitch, which is recycled and used as a heat transferring medium to distil the crude tar.

By this means it is possible to obtain a much closer and more efficient fractionation of the tar into its various constituents than was possible with the old batch still, cracking of the tar to coke is reduced to a minimum and the lighter products are of a purity which requires little or no refining.

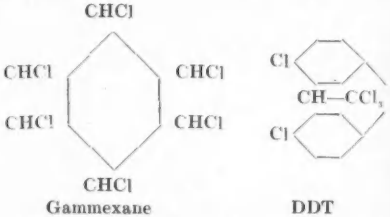
The war and industrial requirements of benzene, toluene and naphthalene were easily met and the development of the plastics industry concentrated attention on the phenols. To-day, pure phenol (M.P. 40° C.), pure ortho cresol, xylenols and higher boiling phenols can be provided, while pitch, creosote, etc., are available for normal use. Basic constituents, such as pyridine and its homologues are now recovered in a high state of purity.

Coal tar has always been regarded as a veritable storehouse of organic chemicals and the number of aromatic compounds now capable of isolation in technical quantities and of comparative purity is rapidly increasing.

Storehouse of Chemicals

The isolation of benzene, toluene and xylenes from the lighter fractions has long been established and modern methods of azeotropic distillation have resulted in the separation of these products in a highly purified condition. The use of these hydrocarbons as dyestuffs intermediates is well known and their application to synthetic medicinal products is continually extending.

Typical examples of the newer developments in the application of these hydrocarbons on a technical scale are the production of the new insecticides gammexane (benzene hexachloride, the gamma-form of which has such remarkable insecticidal properties) and DDT (dichloro-diphenyl-trichlorethane), both of which are manufactured from derivatives of benzene.



Gammexane DDT

On the Continent, before the war, the manufacture of xylene musk (butyl trinitro-m-xylene) was carried out in at least one of the German tar distillation works.

(To be continued)

VULCANISATION ACCELERATORS

VALUABLE REVIEW OF GERMAN RUBBER CHEMICALS

THE subject of rubber accelerators has hitherto been surrounded by an atmosphere of secrecy, and the rubber manufacturer has perforce had to carry out development work on products known to him only through the medium of trade names. This method of selling has its good and bad points, but it is not proposed to discuss these here.

Chemical Constitution

Some light has now been shed on the subject by F.I.A.T. final report No. 1018—issued with the usual warning regarding the possible infringement of existing patent rights—which gives information on German rubber vulcanisation accelerators, including their trade names, chemical constitution and methods of manufacture. Some reports on the German rubber industry have failed to give details of the chemical constitution of accelerators, probably because the industries interrogated knew them only under the I.G. trade name. This report therefore should be of considerable interest to those chemists and technologists who wish to assess any advantages offered by German rubber technique.

The details which are set out below are extracted from the F.I.A.T. report and concern those accelerators which the I.G. produced in reasonable quantities.

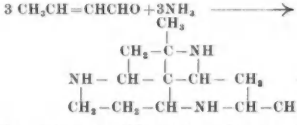
Trade Name	Chemical Name	Type
Vulcazit AZ	Benzthiazylsulfene diethylamide	Normal
Vulcazit CT-N	Tricrotonylidenetetramine stearate (fatty acid liable to vary in constitution)	Normal
Vulcazit DM	Dibenzothiazole disulphide	Semi ultra
Vulcazit D	Diphenyl guanidine	Normal
Vulcazit M	Mercaptobenzthiazole	Semi ultra
Vulcazit H	Hexamethylenetetramine, plus 1% phthalic anhydride	Normal, slow curing
Vulcazit P extra N	Zinc phenyl ethyl dithiocarbamate	Ultra
Vulcazit Thimam	Tetramethylthiuram disulphide	Ultra
Vulcazit 1000	2-Tolylbiguamide	Normal

Vulcazit F

Vulcazit F, a semi-ultra accelerator, was also of considerable importance to the German rubber industry, and consisted of a mixture of 72 per cent Vulcazit DM, 13 per cent Vulcazit D and 15 per cent Vulcazit H.

Vulcazit AZ is a useful accelerator for general rubber goods; it has good ageing properties, normal heat resistance, disperses well in the rubber stock and can be cured with batches containing low percentages of sulphur.

Vulcazit CT-N is used only for abonites and dark-coloured stocks. It is made by reacting aqueous ammonia with crotonaldehyde at 80-85°C. After this reaction is complete, excess ammonia is distilled off and the product dried. The reaction can be represented as follows:—



The tricrotonylidenetetramine is hard and difficult to use, and is accordingly softened to a wax-like consistency by the addition of such softening agents as mono- and dibutylnaphthalene and polymerised ethylbenzene.

The following accelerators can be used for rubber stocks which come into contact with food: Vulcazit P extra N, Cucazit Thimam and Vulcazit 1000.

Vulcazit D

The use of diphenyl guanidine (German trade name Vulcazit D), as a rubber vulcanisation accelerator, is well known in the U.K., but to a large extent it is being superseded by more modern types, such as mercaptobenzthiazole, because of the poor ageing properties of the former.

Nevertheless, the I.G's method of manufacturing diphenyl guanidine is of interest. Sodium cyanide is reacted with chlorine to form cyanogen chloride:—

$$NaCN + Cl_2 \longrightarrow CNCl + NaCl$$

Diphenyl Guanidine Manufacture

A solution of cyanogen chloride is then treated with aniline, hydrochloric acid and water at 30-40°C. and the mix heated to 95°C. After neutralising with sodium hydroxide, excess aniline is removed by steam distillation. The product is treated with sodium bisulphite, sodium sulphite, and then activated charcoal. After filtering caustic soda is added to the filtrate and this precipitates out diphenyl guanidine. This precipitate is filtered off, washed, and dried, after which the accelerator is pulverised and packed.

The report details a number of other I.G. accelerators and gives the production costs, together with production figures for 1944. In addition, numerous methods of manufacturing accelerators, other than those mentioned above, are described. The authors are to be congratulated on producing a useful and comprehensible volume.

PROGRESS IN DRUGS AND FINE CHEMICALS—II

by G. COLMAN GREEN, B.Sc., F.R.I.C., A.M.I.Chem.E.

UNGAR (*Lancet*, March 15, 1947, has explored the possibility of using esters of penicillin. These have been found effective only in those animals which contain the ester-splitting enzyme, esterase, in the blood. The technique is therefore effective in certain animals such as mice, rats and guinea pigs but is ineffective in rabbits and man, the blood of which contains no esterase.

Because of objections to parenteral administration of penicillin much work has been done on administration by the oral route. In this connection, special attention has been paid to the use of enteric capsules and the approximately simultaneous administration of certain antacids.

These methods have all been directed fundamentally to the protection of penicillin from the inhibiting action of the acid stomach juices. Stewart and May (*Lancet*, December 13, 1947, 857) point out that the use of antacids has always given variable results and they have never been equivalent to the results obtained by intramuscular injection.

These workers conclude that the most important factor influencing absorption of penicillin seems to be an unexplained individual variation in the absorptive capacity of the gut.

British and American Work

Collected information concerning the work carried out on penicillin in the U.S.A. and Britain is still awaited. For security reasons no reports of research work on synthesis were made available during the war. Since the war only very brief summaries have been authorised pending the issue of a monograph to be produced jointly by the Medical Research Council (G.B.) and Committee on Medical Research (U.S.A.) Limited-summaries of the work on synthesis were released at the end of 1946 (*Nature*, 1946, *158*, 905; *Science*, 1946, *104*, 431). A brief history of "The Chemical Study of Penicillin" has been offered by the Editorial Board of the Monograph on the Chemistry of Penicillin (*Science*, 1947, *105*, 653). This is a brief summary of the work which has been done in penicillin chemistry from the earliest recognition of the drug by Fleming.

Impressive is the large number of the foremost workers drawn from a variety of industrial organisations and governmental and academic institutions who have been involved in the work, more especially during the past five years; by the utilisation of every advanced technique for the elucidation of chemical structure and for the attempted synthesis and by the failure to date, despite this unique concentration of effort and resources, either to elucidate the structure of penicillin with certainty or to achieve its undoubted synthesis.

This situation reflects the utmost complexity of the chemistry involved—at least, in the final stages of the synthesis since, up to this point, the chemistry is now well understood and synthesis worked out. The work on synthesis, of course, continues, and, in the meantime, the publication of the monograph will be received with profound interest.

Synthetic Methods

Difficulties in achieving chemical synthesis of penicillin have naturally thrown additional emphasis on the possibilities of biosynthesis as a means of producing alternative types of penicillin, with the hope that more potent or bacteriostatically more selective varieties might be obtained, and structure and mode of action further elucidated. The work on biosynthesis really commenced with the discovery that enhanced yields of penicillin could be achieved by the addition of corn steep liquor to the fermentation medium. The yield enhancing substance was identified as phenylacetic acid (and related compounds), but, whereas enhanced yields were obtained from surface cultures, the results were inconsistent and discouraging where submerged mycelium fermentations were concerned.

Benzyl Penicillin

In Great Britain, work was, however, undertaken during 1944 expressly to study biosynthesis following the observation that two different strains of *Penicillium notatum* produced principally benzyl penicillin (formerly "II" or "G") on a corn steep liquor medium but principally 2-pentenylpenicillin (formerly "I" or "F") on a synthetic medium (*Science*, 1947, *106*, 503).

It was found that phenylalanine (a constituent of corn steep liquor) or a number of deamination or decarboxylation products thereof enhanced penicillin yields in surface cultures. Thereafter, by the addition of phenylacetamide to the medium the production of benzyl penicillin was demonstrated with a strain of *P. notatum* which, hitherto, had yielded none other than 2-pentenylpenicillin.

Studies in America led to the discovery of several phenylacetyl derivatives of amino acid which considerably enhanced penicillin yields even in submerged cultures. Considerable specificity was discovered. For example, although N-phenylacetyl-L-valine was an effective precursor N-phenylacetyl-O-valine was ineffective.

The mechanism by which these enhanced yields are obtained is obscure. While, in America, it has been demonstrated that 92.5 per cent of the benzyl penicillin was derived from deuteriophenylacetyl-DL-N^{15}-valine when added to the medium as a precursor, the precursor had not, however, been incorporated in the penicillin molecule intact, since the phenylacetyl moiety had been incorporated but not the amide moiety of the precursor.

By contrast with the situation existing between benzyl penicillin and its precursors, no utilisation of precursors in the series of natural aliphatic penicillins has yet been definitely demonstrated.

It was subsequently found that, by the use of various substituted acetic acids, new penicillins could, unexpectedly, be produced. For example, the addition of N-(p-tolylmercaptoacetyl)-DL-valine as a precursor produced p-tolymercaptomethyl-penicillin which contains a "biologically foreign" grouping in the molecule. A large number of new penicillins have been produced, some of which have been isolated in crystalline form.

A number of reports on the chemistry and synthesis of penicillin, known as the "CPS" (Committee on Penicillin Synthesis) Reports, together with certain American reports are being made available, in a limited sense, by the Medical Research Council. Copies of these reports are being deposited in the libraries of a number of learned societies and commercial firms; a list of these has been published (*Nature*, 1947, *159*, 566). The subject matter of these reports may not be the subject of any publication before the monograph referred to above is made available.

Streptomycin

The production, chemotherapy and toxicity of streptomycin, the antibiotic produced by *Streptomyces griseus* were dealt with at some length in THE CHEMICAL AGE annual review of 1946. Miller, whose views on penicillin resistance have already been noted above, has summarised, also, the position regarding what is known of streptomycin resistance. In sharp contrast with penicillin, resistance to streptomycin is more easily acquired in clinical treatment by initially susceptible micro-organisms.

There is considerable evidence that this fact alone may substantially limit the usefulness of this drug. For example, in treating infection of the urinary tract by gram-negative, streptomycin sensitive micro-organisms, the infection must be brought under control in a few days otherwise the acquired resistance is such that the infection cannot be eliminated by even the maximum tolerated dose of streptomycin.

In the course of his work on streptomycin resistance, Miller found that some variants of meningococcus possessed the surprising and alarming characteristic of actually *requiring* streptomycin for growth. The variant multiplies abundantly at all concentrations of this drug, but dies in streptomycin-free media. This streptomycin dependence can be demonstrated both *in vitro* and *in vivo*. So far, no *clinical* evidence has accumulated of streptomycin-dependent organisms; but, as Miller points out, this may well be due to the fact that streptomycin containing media are not usually used for the cultivation of infecting organisms isolated from the patient.

In normal practice, even if the infecting organism were streptomycin dependent it would fail to develop in culture. Miller finds that these streptomycin-dependent strains retain all the properties of normal meningococcal strains including that—fortunately—of penicillin susceptibility.

Disquieting Evidence

In extension of these astonishing and disquieting findings is the fact that Hall & Spink (*Proc. Soc. Exper. Biol. and Med.*, 1947, *64*, 403) have isolated a strain of *Brucella* which, while not dependent upon the presence of streptomycin for growth, does, nevertheless, grow better in the presence of the drug than in its absence. It is also reported (*Science*, 1947, *106*, 587) that Kushnick *et al*, have, independently, isolated strains of *E. coli*, *Ps. aeruginoza*, and *B subtilis* which are actually streptomycin dependent.

Thus it will be seen that whereas, at the moment, the concensus of opinion is that clinical induction of resistance to penicillin is not a serious risk, the risk of induction of resistance to streptomycin is very great, a situation which is complicated to an, as yet, unknown extent by the existence of normally streptomycin-susceptible organisms which have streptomycin-dependent variants

(*To be continued*)

Employment in October.—An increase between September and October of 3000 (to 365,000) in the number employed by U.K. chemical industry is recorded in the December issue of the *Ministry of Labour Gazette*. A substantially larger increase occurred in the same period in the number employed in chemical and metal production for export—from 109,500 to 116,900.

Italian Oils and Chemicals

Substitutes Aid to Rising Production

THE production by Italian chemists of a satisfactory substitute for linseed oil is one of the most interesting developments in the Italian paint and varnish industries, in which the 150 plants now supplying the home market has had to rely to an increasing extent on synthetic or substitute materials. This applies in particular to linseed oil the supplies of which are less than 10 per cent of the required level. The oil now being extracted from grape seeds is reported to be an excellent substitute.

Adequate Supply

Grape-seed oil is used in the preparation of drying oils and stand-oils, and mixed with glycerine and anhydrous phthalic in the production of glycerophthalics and resins is in no respect inferior to those made from linseed-oil. The Italian output of grape seed oils is sufficient to cover the normal demand of the paint factories. Moreover, oil varnishes are being gradually and advantageously replaced by synthetics prepared with glycerophthalic resins, better and more resistent varnishes being thus obtained.

The glycerophthalic resins used in making paints and varnishes are generally of three qualities: short, average and long, in which the respective percentages of oil are 45-50 per cent, 55-60 per cent and 65-70 per cent. The "short" and "average" qualities are better suited for the preparation of fire-dried, anti-rust and stucco work paints; the "long" qualities, used in making air-dried paints and varnishes are resistent to blows, scratches and weather and are therefore best suited for vehicles and machinery.

Chinese wood-oil, a basic raw material for many high-class paints and varnishes, disappeared completely from the market during the war, and has been replaced by "sintolegno" a synthetic wood-oil obtained by dehydrating castor-oil and grape-pip oil. it is a complete substitute for the Chinese wood-oil.

Phenolic Resins

Another raw material which has made great progress in Italy is synthetic resin prepared from colophony and phenols and marketed under the name of "Albertoli" the name of its original manufacturer. The qualities of these resins enable them to replace fully and advantageously imported copal, Zanzibar and Batavia resins, etc.

A raw material of which there is now great scarcity in Italy and the cost of which has gone up very much in the last few months is anhydrous phthalic, the output of which has been greatly reduced by the restrictions placed on the consumption of electric power.

Sulphur Industry Halved

Little Prospects of Italian Exports

THE Italian sulphur mining industry, which is concentrated chiefly in the Sicilian provinces of Caltanisetta, Agrigento, Catania and Palermo, is reported to be passing through a difficult period. Although this old-established Italian industry declined in importance steadily since the beginning of the century, when Italy ceased to hold the sulphur monopoly, it nevertheless maintained a leading position among world producers, the annual output aggregating some 300,000 metric tons of raw sulphur before the war. The present output totals some 140,000 metric tons, of which about 86,000 tons are mined in Sicily, the remainder on the Italian mainland.

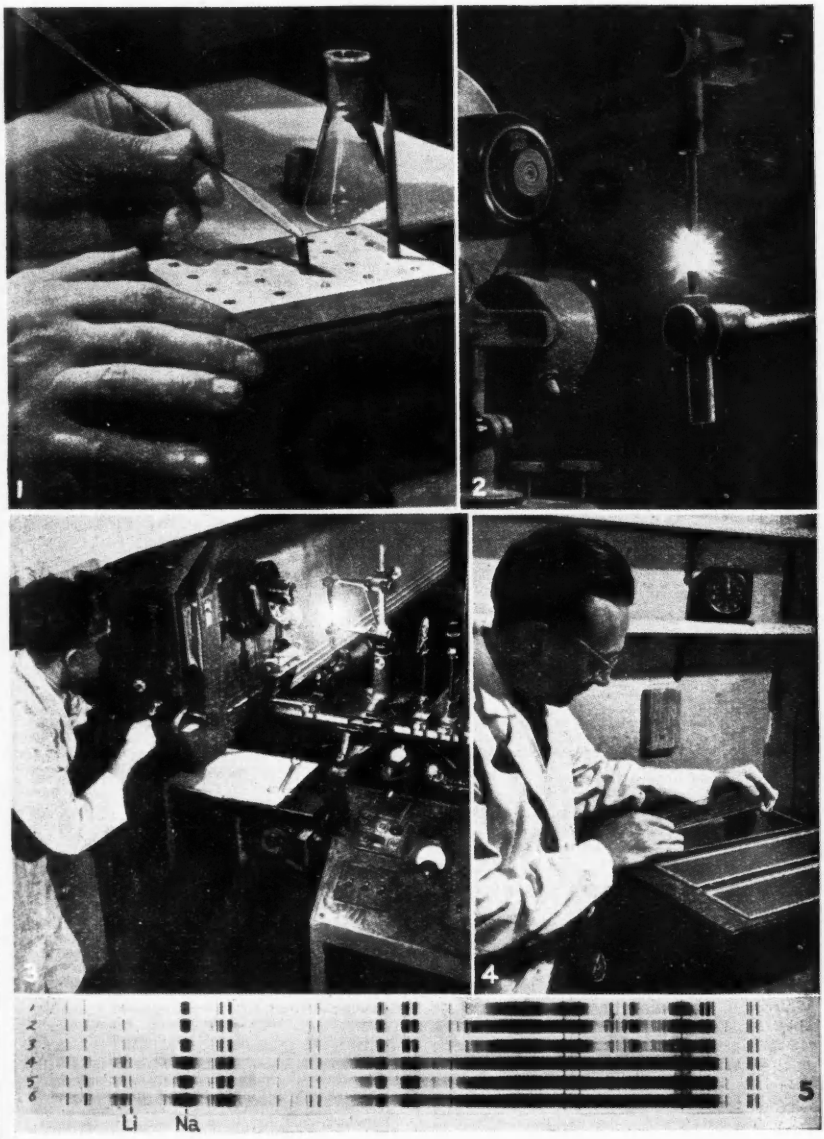
Even if output could be increased—by resuming work in additional mines which remain closed since the Allied landings in Sicily—it would be difficult, if not impossible, to market this higher production. Italy's own requirements total some 100,000 metric tons and the former position in world markets has not been restored.

THE SPECTROGRAPH

Because it provides a means of reducing to a minimum the time spent in analysis of a great range of chemicals and metals, the spectrograph is likely to rank among the instruments making the most significant contribution to current scientific development. Representative of some of the methods of contemporary spectrography are the pictures (facing this page), taken in the Central Research Laboratory of Canadian Industries, Ltd., at Beloeil, Quebec. They show (1) A minute quantity of the sample being placed in the concave centre of the lower electrode; (2) The sample ignited as the current flows between the extremely pure graphite electrodes; (3) The actual recording of the spectrum as the sample becomes incandescent; (4) Developing and fixing the resulting spectrograph plate; (5) Plate of a quantitative analysis in which Li (1 and 2) represents unknown quantities of lithium in brine and Na the presence of sodium. Lines 3 to 6 are known standard spectra for quantitative comparison.

(Courtesy of "C.I.L. Oval")

Spectrochemical Analysis



ATOMIC ENERGY REPORTS

Further Release of Official Information

THE release by the Ministry of Supply of a large number of British reports on atomic energy has been announced. These are now available in the form of prints from microfilms (9 in. by 7 in.) from H.M. Stationery Office, P.O. Box 569, London. S.E.1. Full particulars of the reports, the earliest of which is dated February, 1942, and the latest July, 1947, are as follow :—

No.	No.	
99	Br. 10	Organic derivatives of U (Haworth) (2s. 11d.).
100	Br. 18	Uranyl Fluoride — Miscellaneous Notes — Note No. 8 — The Adsorption of Atmosphere Moisture by Anhydrous UF_4 (A. M. Roberts) (2s. 3d.).
101	Br. 174	Investigation of the pressure-density relationship for the Hexafluoride of U at 49.2° C. (C. B. Amphlett and L. F. Thomas) (2s. 3d.).
102	Br. 27	Uranyl Fluoride — Miscellaneous Notes—Note No. 17. The true and packing densities of Anhydrous UF_4 (A. M. Roberts and B. G. Harvey) (1s. 7d.).
103	Br. 36	The reduction of UF_4 by Hydrogen (J. Ferguson) (4s. 3d.).
104	Br. 182	Pressure density relationship for UF_6 at 50° C.—revised figure for $\left(\frac{\delta e}{\delta P}\right)$ — 50° (C. B. Amphlett) (2s. 3d.).
105	Br. 186	The Vapour Pressure of UF_6 from 12° to 50° C. (C. B. Amphlett) (2s. 3d.).
106	Br. 187	Determination of the Vapour density of UF_6 at room temperature (C. B. Amphlett and L. F. Thomas) (1s. 7d.).
107	Br. 222	The Analysis of Gaseous Fluorine. Part I. The determination of total and free fluorine (A. F. Williams) (7s. 7d.).
108	Br. 188	Determination of the Ultra-Violet absorption of UF_6 Vapour (A. E. Martin and C. B. Amphlett) (2s. 3d.).
109	Br. 166	Gland Experiment (H. S. Arms) 8s. 11d.).
110	Br. 167	Experiments on the Pressure Dependence of Heat Conductivity Concentration Meters (A. F. Brown) (6s. 11d.).
111	Br. 242	Absolute Calibration of a Neutron Source (O. R. Frisch) (5s. 7d.).
112	Br. 280A	Remarks on some Physical Properties of Uranium Metal (F. E. Simon) (8s. 3d.).
113	Br. 281	The Viscosity of Gaseous Fluorine—Critical Literature Survey (Rudge and Southam) (6s. 3d.).
114	Br. 315	Notes on Br. 44 " On the Correction for Self-Absorption in β-ray measurements," Broda, Geuron and Kowarski, 1942 (N. Feather) 6s. 3d.).
115	Br. 425	Determination of U_{235} content of enriched uranium samples (E. Bretscher and E. B. Martin) (2s. 3d.).
116	Br. 397A	Memorandum on American Tests on Fluorocarbon Lube Oils (J. R. Park) (1s. 7d.).
117	Br. 516	A Hard Valve Pulse Analyser (M. J. Poole) (12s. 3d.).
118	Br. 37	Stability of Solutions of UCl_4 in Alcohol, Acetone and Water (C. B. Amphlett) (2s. 3d.).
119	Br. 673A	The Analysis of Nitrogen—Argon Mixtures (P. A. I. Tahourdin) (4s. 11d.).
120	Br. 718A	The Tensile Properties of Uranium at Elevated Temperatures in the a Range (National Physical Laboratory) (1s. 7d.).
121	Br. 775	Preliminary Creep Tests on 99.8 per cent. Aluminium at 300°, 350° and 400° C. (British Non-Ferrous Metals Research Association) (6s. 11d.).

P.B. No.	M.D.D.C. No.	No. of Frames	
52201	462	45	Thermal Conductivity Gas Analyser (30s. 4d.).
52202	463	42	Theory of the Refraction and the Diffraction of Neutrons by Crystals (28s. 4d.).
52205	478	22	The Radiography of Heavy Radioactive Metals (14s. 11d.).
52207	346	50	Differential Pressure Indicator (Instructions GEI-21100A) (33s. 9d.).
52209	352	17	The Self Diffusion Coefficient of Uranium Hexa-Fluoride (11s. 7d.).
52765	247	30	Rules and Procedures concerning Radioactive Substances and Associated Hazards (20s. 4d.).
62598	93	12	Half-Life of Uranium 234 (8s. 3d.).

MORE REPARATIONS PLANTS ANNOUNCED

THE Inter-Allied Reparations Agency, in Brussels, has announced that general purpose equipment designed for peacetime production from 11 additional German war plants will be considered for allocation as reparaton among the Western Allied Nations in the near future. These plants, their location and principal wartime products, are :—

Wolf & Company, associated with Eibia G.m.b.H. fur Chemische Produkte Factory B., Doerverden, Hanover, propellants ; Feinmechanische Werke Howacht (Anschutz subsidiary), Howacht-Kiel, gyro-compass equipment ; Luther & Jordan Werk I, Braunschweig, aircraft assembling and testing, trailer production ; Luther & Jordan Werk II, Bienrode, near Braunschweig, aircraft assembly and testing ; Luther & Jordan Werk IV, Braunschweig Bahnhofstrasse, aircraft assembly testing ; Bergisch-Markisches Eisenwerk Franz Metzger, Factory 3, Velbert/North Rhine, ammunition ; Bismarckwerke A.G., Wuppertal-Ronsdorf, shell bodies, fuses, radar screens ; Buecke A.G., Wipperfurth, North Rhine, bomb cases, A.A. shells, shell fuses ; Leichtmetallbau W. Schultze, Bahrenfeld/Hamburg, industrial tanks, aircraft fuel tanks, cockpit canopies, fins (MEs) ; Pommersche Motorenwerke G.m.b.H., Rissen Hanestadt, Hamburg, and Grassman & Company, Bielstein Bez, Koln, Wieltalerstr., N. Rhine,

"Information, Please"

What the Workers Chiefly Want to Know

by a Shop Steward

TO me, the sharing of information is the first step towards better industrial relations. In the main, there are two kinds of information involved. First, what the worker wants to know and, second, what he ought to know. Examples of the former

COMPLEMENTING many recent statements by managements of policy designed to promote wider understanding among workers of the objectives at which their undertakings are aiming is this exposition by a shop steward, Mr. John Powell, tool maker at the Mitcham works of Philips Electrical, Ltd. There his experience as joint secretary of the Production Advisory Council has given him special opportunities of observing from the workers' viewpoint some of the kinds of information which workers seek, but do not invariably receive

are the methods of calculating wages and bonuses, the reasons for and explanations of deductions, and, in fact, everything that a person who is hiring out his services is entitled to know about the price paid for them and the conditions under which they are hired. Such information is indispensable and yet there are thousands in industry today who could not tell you how their piecework earnings are calculated.

Wage systems have become very complicated but few attempts have been made to explain them in simple terms. Many workers genuinely believe that this is a policy deliberately pursued in order to confuse them and deprive them of earnings. Scientific management is all very well but there is something amiss when workers cannot calculate their own piecework earnings nor even guess at the way in which their jobs are rated. Ignorance about these matters is a chief cause of discontent and yet one which can so easily be eliminated.

Causes of Suspicion

So much for what the worker wants to know. What he ought to know covers a very wide field and it is here that employers could feel they had the soundest grounds for secrecy. But if the worker is to be a useful partner in industry he must have sufficient information to enable him to accept corresponding responsibilities.

To so many it seems that the only reason why facts about a company's social, financial and production policies are not divulged is because there is something to hide. That is how rumours of corrupt practices arise: that is what makes suspicion so rife.

Now I want to tell you something about the machinery needed for this vital exchange of information. It is obvious that there must be some regular and convenient means of information passing back and forth between worker and management. And there must be adequate opportunities for explanation and discussion. Joint consultation as practised in the more progressive organisations certainly provides these facilities.

Not only does it bring into the open questions which would otherwise remain unasked or unanswered but it also provides the extremely important two-way channel. The workers are able to put forward their points of view on all matters thus enabling management to answer criticism and deal with problems before imagination has run loose in the works.

The Whole Story

But joint consultation, as I know it, is still in its infancy. I regard it as a management responsibility to educate and inform the workers' representatives about the organisation and functioning of the plant. We adopt such measures at Philips. The recent series of lectures included one on management by the general manager, one on production control by the production manager, and others on production engineering, time and motion study, laboratory work, administration, and personnel management by the heads of the respective departments.

After these lectures the shop stewards fully appreciated the immensity of the managerial task and they were prepared to admit that their doubts about the value of some of these departments were completely dispelled. One valuable result of the scheme has been to raise the level and widen the scope of discussion in joint consultation with obvious advantages to both management and worker.

So far so good. In this way we are slowly establishing a nucleus of informed people on both sides of the fence. The problem of spreading the gospel still remains to be solved, however, and this is where the publicity people should come into the picture. I believe that all possible forms of publicity should be used within industry to inform, instruct and inspire.

The mass presentation of information is a problem which we have studied closely in our

American Steel and Aluminium

Record Production In 1947

IN 1947 the United States industry produced more than 84 million tons of steel, a record peacetime tonnage. This total was announced by Mr. Walter S. Tower, president of the American Iron and Steel Institute.

Steel production in 1948, he forecast, should equal or exceed that of 1947, assuming that existing and additional steel capacity can be operated without interruption from work stoppages or strikes, and without shortages of raw materials. Domestic and foreign demand were expected to remain heavy.

Companies would have the benefit of some of the new producing facilities which have been under construction for a year or more as part of the industry's billion-dollar expansion programme. As in 1947, the greatest possible deterrent to larger output, however, might be insufficient quantities of good quality scrap.

Technological Advances

Reviewing technological improvements in 1947, Mr. Tower reported that experiments have indicated that higher production of pig iron can be obtained by increasing the amount of pressure exerted by blast furnace blowers and throttling exhaust gases. The use of oxygen to speed steelmaking in open-hearth furnaces might still be considered in the development stage. In general, there were two main processes. One used oxygen to enrich the flame of the open hearth, and the other consisted of injecting oxygen into the bath in the open hearth. Melting time for open hearth steel could also be reduced by desiliconisation of hot iron before charging it into the open hearth, and by treatment of the hot metal for elimination of sulphur.

Aluminium Production

Reviewing aluminium production in 1947, Donald M. White, secretary of the Aluminium Association, said that while more than a billion lb. of primary aluminium were produced, the industry has been hard pressed to meet demands, and shortages of other materials had only served to increase the demand for aluminium. In 1947 the automobile industry alone consumed about 100 million lb., and some experts believed this amount will be trebled in 1948.

INFORMATION, PLEASE (*Contd. from page* 111)

factories. I think it is correct to say that Philips were one of the first companies to use works relations publicity during the war, and it is certainly safe to say that they are one of a very small number who have persisted with these methods. This is clearly a tribute to a progressive management but, more important still, it shows how workers will respond to an intelligent and skilful approach.

We have been through all the phases of internal publicity from the emotional appeals of the Dunkirk era to the informative schemes of post-war joint consultation plans, and I have seen how sheer persistence in the use of publicity has broken down much of the earlier scepticism. There are, of course, other reasons why this publicity is accepted by the workers—their representatives are always consulted when major schemes are being considered, the management never tries " to put something over," and we have a popular and understanding man in charge of the information service.

Our basic means for keeping workers informed are our information centres—very large display boards situated in commanding positions throughout the factory. These boards carry the minutes and abridged reports of our Joint Advisory Council meetings, topical posters, sports and social news, etc.

A series of photographs entitled " Know Your Neighbour " describes other departments in the factory and has been running for many months now with a good deal of success. All this can be described as our general information service and it is supplemented by a group magazine produced by the Central Personnel Department.

A Moral

Getting down to the job itself is something we are equally concerned with. You may have heard about the labourer who was told by his foreman to dig a hole so many feet deep in the road. When he'd dug it the foreman told him to fill it in and dig another somewhere else. This process was repeated several times until the labourer lost his patience with the foreman and expressed himself in no uncertain terms. Whereupon the foreman explained that he was trying to locate a gas main. " Well, why didn't you tell me that before?" asked the labourer, and proceeded to dig quite happily now that he knew that his efforts weren't being wasted.

That story shows the moral need for giving information to create interest and pride in the job, and you can take it from me that a man works all the better for knowing what it's all about.

American Chemical Notebook

From Our New York Correspondent

THE Wheatland Tube Company has announced that it will construct a $500,000 chemical plant at Wheatland, Pennsylvania, where its plans to manufacture chemical products. It will use waste materials from the company's tube factory, which at present pours them into the Shenango Creek. The new plant, scheduled to function from next August, will be operated by a Wheatland affiliate, the Maneely Chemical Company.

* * *

General Brehon Somervell, president of Koppers Company, Inc., Pittsburgh, Pennsylvania, in a year-end review of the company's 1947 activities, declared that there are many reasons for optimism in 1948. At the same time, he asserted that possible sudden economic changes may tend to upset the present favourable outlook. "Factors that may have a great effect on industry in 1948," he said, "include the continued high cost of government with continued high taxation of business; it is possible that the 'aid to Europe' programme may bring about Government controls, and thus cause scarcities of some basic commodities. During 1948 the company will continue to devote a large amount of research effort to the development and improvement of chemical products. New facilities for producing polystyrene, and other chemicals and chemical compositions are under construction at Kobuta, Pennsylvania, and will be put into operation in the first half of the year. During 1948 also, a considerable amount of research will be devoted to development of processes for making synthetic liquid fuels and other chemicals from coal.

* * *

By March 1 it is expected that construction work will begin on a new $80 million synthol plant to be erected by the Stanolind Oil and Gas Company in Western Kansas. It will be located near the Kansas portion of the Hogoton gas field, and will be used for the conversion of natural gas to liquid fuels and chemicals. Oxygenated chemical compounds such as alcohols, organic acids, and aldehydes, the raw materials for the rayon, plastics, surface coatings and pharmaceutical industries, will be produced. Output is under contract to the United States Industrial Chemicals Company, Inc., New York City, which will maintain warehousing and distribution operations adjacent to the new conversion plant.

* * *

The Du Pont Company is expanding facilities at its Carney's Point, New Jersey, works for the production of sodium carboxymethyl cellulose, or sodium CMC, a chemical compound that is finding wide application in such fields as textile yarn sizing, dyeing and finishing, paper making, paints and lacquers, adhesives, printing and photography. Greatest emphasis will be placed on the production of technical grades of sodium CMC to provide a low-priced material suitable for some of the major industrial applications. Sodium CMC is the sodium salt of carboxymethyl cellulose, which is often referred to as cellulose gum, sodium cellulose glycolate, and the sodium salt of a cellulose ether-acid. It is a water-soluble cellulose ether produced in several grades and types, and can serve as an emulsifier, protective colloid, or thickener, sizing agent or protective film. Insoluble in organic solvents, greases and fats, its film may be treated to yield a considerable degree of water resistance.

Synthetic Fuels Essential

U.S. Will Need 2m. Barrels Daily

A WARNING that America urgently requires to establish a synthetic fuel industry on the largest scale for economic and strategic reasons was given by W. C. Schroeder, chief of the office of synthetic liquid fuels of the U.S. Bureau of Mines, when he addressed engineers at the fuels session meeting of the recent annual meeting of the American Society of Mechanical Engineers.

To provide plants capable of producing one to two million barrels of synthetic liquid fuel daily would require several years and large amounts of steel and other construction materials, and manpower, he said. This programme would be about five to ten times the magnitude of the synthetic rubber programme during the war.

Cost of synthetic fuels at such a plant would be from three to five cents a gallon higher than present prices of petroleum products, although this might be reduced by process improvements, already being developed, and by large-scale operation. The raw materials would include natural gas, coal and oil shale.

While there was a known reserve of 21 billion barrels, plus a small net import, domestic reserves must soon be increased or new sources of supply found, Mr. Schroeder asserted. The picture was "disquieting" since with mounting consumption, recent oil discoveries have failed to alleviate the position. So far as the importation of foreign oil was concerned, the proportion available to the U.S. tended to diminish.

LETTER TO THE EDITOR

Patent Application

SIR,—We have read with surprise in the issue of THE CHEMICAL AGE of November 22, 1947, your report about British Patent Application No. 26487/1947 made by Carlfors A/B. and K. G. Winquist, of Huskvarna, Sweden, for the separation of aluminium flake powder particles by an air or gas stream according to their specific surface. We note that the aluminium flake powder referred to in this application is mainly intended for the manufacture of aerated concrete, but also for the paint industry.

The surprise we felt on reading this report is occasioned by the fact that we have used this method for approximately 15 years in the production of aluminium flake powder. At first our use of this method was exclusive, but for the last 12 years it has also been employed in the United States, where the method is used in a slightly modified way. Patents have been granted in this country in all these cases. (i) The method used by our American colleagues includes the use of a screen, in addition to the gas elutriator used by ourselves.

It is a well-known fact that sedimentation and elutriation (which is the reverse phenomenon) depend largely on the specific surface and thickness of the powder flakes. This has been emphasised before (ii).

We have habitually and methodically separated our products by this method, *i.e.*, according to their specific surface. This appears to be identical, in the present instance, with separation according to diameter as was shown in a recent paper (iii).

It was demonstrated that for any powder produced by any given machine, the ratio of diameter to thickness was constant, irrespective of size.

Furthermore, the powders which we have manufactured by the above method have been used, on a very large scale, in the manufacture of aerated concrete as well as in other fields of application, including paint.

We thought that this information might be of some interest to you and your readers. —Yours, etc.,

H. MEYERSBERG,
English Metal Powder Co., Ltd.,
West Drayton, Middlesex.

REFERENCES.

(i) B.P. 341,561.
B.P. 360,142.
B.P. 430,777.
B.P. 486,845.
(ii) *Paint Manufacture*, 1947, *17*, 373.
(iii) Symposium on Powder Metallurgy, 1947. 37.

Energy "On Tap"

Ingenious Italian Use of Ethyl Chloride

ONE of the most ingenious examples of the harnessing of natural energy to serve industrial ends is to be found on the Island of Ischia, in the Bay of Naples, where Italian engineers and chemists have been able to replace the obsolete diesel-electric power producing plant by a new power system based on the island's thermal springs.

The installation, which is the subject of an illustrated article in *The Electrician* (January 9), exploits the volatile properties of ethyl chloride in the presence of the warm water from underground sources.

The water—says *The Electrician*—is raised by an electric pump to a container in the power station; inside this container is a so-called "boiler," holding distilled water. Volatile ethyl chloride is injected into the "boiler," where it evaporates rapidly as a result of the heat transmitted to it from the natural hot water. Ethyl chloride vapour, with a small quantity of water vapour, is passed through lagged piping to drive, at low radial speed, a simple turbine consisting of a single-vaned wheel.

The vapour, after passing through the turbine, is condensed in a surface condenser using cold water pumped in from the sea; condensed ethyl chloride is then again injected into the "boiler" to re-start the cycle. Owing to the volatile nature of the chemical, great heat is not required and the working temperatures of "boiler" and cooling sea water are given as 55°C. and 25°C. respectively.

To Run Indefinitely

As the sources of hot and cold water are close to the power station little energy is required to work the pumps. The useful output from the set is 300 kWh. Once started, the plant is designed to run indefinitely on heat derived from natural sources; it uses no fuel and needs little attention.

An initial charge of about 1½ tons of ethyl chloride was necessary to operate the plant, with an additional ½ ton in reserve for topping up. Losses in the closed circuit, however, are expected to be negligible.

Although the peculiar advantages of this ingenious generating set are due to the use made by the Italian engineers of unlimited natural supplies of hot and cold water found close together in Ischia, the principle of employing ethyl chloride in a compact closed circuit to operate turbines, wherever waste heat is available, appears to offer considerable possibilities.

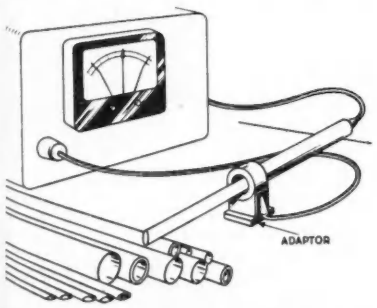
Progress of Electronic Inspection

INSPECTION by means of electronic instruments has passed out of the experimental stage. Following the publication of experimental and theoretical data concerning the development and employment of English standard electronic inspection units, valuable practical applications have been made possible. They were made under normal working conditions in a wide variety of production plants and the results confirm that the instrument has reached a stage in its development when it can become more generally acceptable as a practical inspection medium.

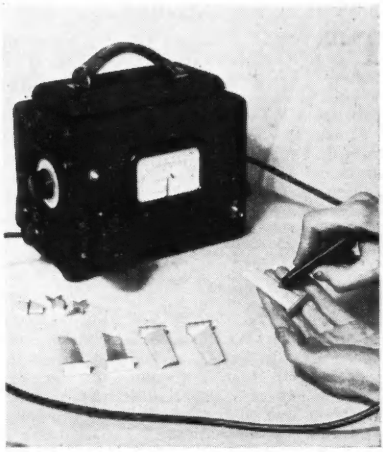
The industries in which successful applications already exist cover a wide field, and, in pointing the way to further similar uses, those examples of practical applications, all employing the same basic instrument, indicate that considerable headway has been made towards attaining the aim inspiring the development of the Cornelius Electronic Comparator. That is the production of a standard electronic instrument capable of carrying out more efficiently and more rapidly all the usual inspection tests required in modern engineering practice as well as many tests which cannot be performed in any other way.

Six Types of Use

Broadly speaking, applications of the instrument to production engineering inspection fall into six groups: Material and component inspection for chemical composition, hardness, and for cracks and flaws of all types on or below the surface. Dimensional comparison with micro-inch sensitivity. Plating and coating inspection, including verification of the adhesion of plating or under-coating. Surface finish comparison.



One of several simple adapters for testing metallic samples



For more detailed examination—of anodic coatings—after thickness has been measured by a probe on the front of the instrument, this free probe locates cracks on weak spots

Stress-strain analysis. Hardness testing, particularly of parts with highly finished surfaces and where the operating area is restricted.

All these tests are performed non-destructively by the electronic instrument and in most cases as rapidly as it is possible for an operator to place the test subject into the receptacle of the adaptor, or apply a simple probe to the test subject, and observe the needle on the instrument meter.

The inspection result is a precise comparison between a known sample and the test subject. The instrument meter is zero-set by placing the known sample into the adaptor and adjusting the meter needle by means of two controls; the sample is then removed and the test subjects placed into or passed through the adaptor in succession, any variation from the standard test-piece being indicated immediately in the meter reading. The nature and extent of the meter variation is directly related to the nature and extent of the defect in the subject.

In addition to simplicity of operation and extreme accuracy in detection and measurement, a valuable feature of the test performed by the electronic comparator is the ease with which it can be combined with, or superimposed upon an operation already established as part of the production cycle. It can then act simultaneously with that operation and provide a postive test.

D

World Petroleum Supply

THE growing importance of petroleum as a raw material for the chemical industry, is reflected in world production figures published in the January issue of *Petroleum Press Service* (reproduced below).

Almost all producing countries have increased their outputs, the most striking advances being those of the U.S.A. and Venezuela, with Iran and Saudi Arabia achieving even more spectacular outputs if judged on the basis of percentage increase rather than on actual quantities.

Instances of Decline

Among the few instances of production comparing unfavourably with that of 1938, Rumania and the Dutch East Indies are prominent. In both cases this has been due to destruction brought about by the war, and the difficulty of restoration in the post-war era, plant and equipment replacements being particularly problematical.

The estimated world output in metric tons is as follows :—

	1947	1946	1938
U.S.A.	250,000	234,215	164,066
Venezuela	63,500	56,700	26,890
U.S.S.R.	26,000	22,800	29,700
Iran... ...	19,800	19,497	10,359
Saudi Arabia ...	12,000	8,200	67
Mexico	7,200	7,040	5,460
Iraq...	4,700	4,700	4,364
Rumania	3,800	4,193	6,610
Colombia	3,500	3,189	3,127
Argentina	3,000	2,976	2,443
Trinidad	2,900	2,890	2,450
Kuwait	2,700	800	—
British Borneo ...	1,850	300	864
Peru	1,700	1,663	2,096
Egypt	1,300	1,280	223
Bahrein	1,100	1,100	1,157
Canada	850	980	864
Austria	760	846	57
Dutch E. Indies ...	700	300	7,394
Hungary	600	685	37
Germany	550	642	552
Ecuador	300	307	309
Other countries ...	1,309	1,150	2 514
World total ...	409,610	376,453	271,583

COST OF THE N.C.B.

A SUGGESTION in the national Press recently that of the rise of 6s. 6d. per ton in the pithead price of coal during 1947, 1s. 8d. had gone "to pay for unproductive officials," compared with 2½d. per ton under private enterprise, has been denied by the National Coal Board.

An official statement says that in 1946, before nationalisation, the cost of clerical, technical and managerial staffs was about 1s. 2d. per ton. Now, continues the statement, it is about 1d. more, despite the many services, medical, training, scientific and educational, now being extended to the industry as a whole.

Next Week's Events

MONDAY, JANUARY 19

Chemical Society and University College of Swansea Students' Chemical Society. University College, Swansea, 6 p.m. P. Gross : "The Physical Chemistry of Some Vacuum Metallurgical Processes."

Institute of Welding (North London Branch). Royal Society of Tropical Medicine and Hygiene, 26, Portland Place, W.1, 7 30 p.m. S. M. Reisser : "The Welding of Bridges and Buildings."

TUESDAY, JANUARY 20

Society of Chemical Industry (Agriculture Group). Physical Chemistry Lecture Theatre, Royal College of Science, Imperial Institute Road, S.W.7, 2.30 p.m. S. J. Rowland : "Recent Studies in the Composition of Milk." Chemical Engineering Group. Burlington House, Piccadilly, W.1, 5.30 p.m. C. H. Desch : "Abrasion, Erosion and Corrosion."

Institution of Rubber Industry. Caxton Hall, Caxton Street, S.W.1, 7 p.m. Robert Cantor : "Industrial Design and the Rubber Industry."

WEDNESDAY, JANUARY 21

Royal Institute of Chemistry (Dublin Section) and Irish Chemical Association. Dept. of Chemistry, Trinity College, Dublin, 7.30 p.m. W. Cocker : "Santonin." London and S.E. Counties Section. Wellcome Research Institution, Euston Road, N.W.1, 6.30 p.m. H. N. Linstead : "Science and Parliament."

North Western Fuel Luncheon Club. The Engineers' Club, Albert Square, Manchester, 12 noon. Arthur L. Horner : "One Year of Nationalisation."

THURSDAY, JANUARY 22

Chemical Society. Burlington House, Piccadilly, W.1, 7.30 p.m. Dr. E. R. H. Jones : "Acetylene and Acetylenic Compounds in Organic Synthesis." (Tilden Lecture).

Chemical Society. Chemical Lecture Theatre, University College, Nottingham, 6 p.m. Prof. Brynmoor Jones : "Some Aspects of Aromatic Substitution."

Royal Institute of Chemistry (Edinburgh and East Scotland Section), Chemical Society and Society of Chemical Industry. North British Station Hotel, Edinburgh, 7.30 p.m. Dr. H. T. Openshaw : "Some Recent Developments in Alkaloid Chemistry."

FRIDAY, JANUARY 23

Midland Chemists Committee. University, Edmund Street, Birmingham, 6.30 p.m. Dr. H. W. Thompson : "Applications of Infra-red Spectroscopy."

Chelsea Polytechnic. Manresa Road, S.W.3, 7.30 p.m. L. Ivanovszky : "The Modern Chemistry and Technology of Waxes."

"Alcian Blue" Exhibition

The intimate and practical concern of the Cotton Board with scientific and technical progress affecting industry was reflected in the opening on Wednesday at the Board's Design and Style Centre, Manchester, of an exhibition produced in collaboration with Imperial Chemical Industries, Ltd., to make widely known the latter's latest dyestuff, Alcian Blue 8GS. The exhibition is in two sections, illustrating the technical background of the dyestuff and its application to dress and furnishing fabrics, of which the former deals with the history of the research by which Alcian Blue was produced, its chemistry, testing and manufacture. The exhibition remains open until February 7.

PERSONAL

SIR A. DYKES SPICER has resigned from the board of Dufay-Chromex, Ltd.

MR. KENNETH HORNE, since 1946 sales director of Triplex Safety Glass Co., Ltd., has now joined the board of Lancegaye Safety Glass (1934), Ltd.

SIR KENNETH BRAND HARPER has been appointed to the board of "Shell" Transport and Trading Co., Ltd., in succession to Mr. R. I. Watson, whose resignation was announced in THE CHEMICAL AGE last week.

MR. JAMES FINDLATER, of Bryneithin Avenue, Prestatyn, is to retire from the chairmanship of Price's (Bromborough), Ltd. He will be succeeded by MR. W. F. DARKE, of Brimstage, Wirral.

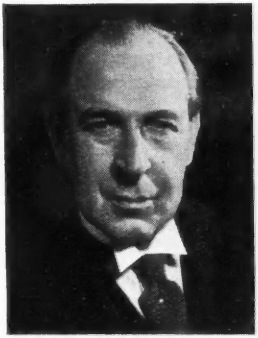
MR. M. W. PARISH and MR. C. A. P. TARBUTT have resigned from the board of British Lignite Products, Ltd., This company has announced the appointment of two new directors—MR. E. S. YARWOOD and MR. O. A. K. WILSON—who are taking over the technical direction.

MR. H. ROBERTS, a boilermaker employed at the Fleetwood establishment of I.C.I., has had his essay on "The Modern Welding Technique of High-Pressure Tubing" accepted by the Institute of Welding, of which he has now been elected an associate member.

SIR HENRY TIZARD was last week installed as president of the British Association, succeeding SIR HENRY DALE. The association's concern in the coming months will be largely with scientific matters having a bearing on the present export policy. The 1948 meeting will be held at Brighton on September 8-15.

DR. CHARLES ALLEN THOMAS, executive vice-president and technical director of Monsanto Chemical Company, St. Louis, Missouri, has been unanimously selected to receive the 1948 gold medal of the American Institute of Chemists. The award is made in recognition, not only of Dr. Thomas's work in the development of atomic energy and his leadership in research, particularly in synthetic resins, but also for his administrative ability and his encouragement of basic research. Presentation of the medal will be made in New York City on May 8.

SIR JOHN ANDERSON, G.C.B., F.R.S., who last week resigned from the chairmanship of the Advisory Committee on Atomic Energy, which is being dissolved, has been re-appointed to the board of Imperial Chemical Industries, Ltd., from which he resigned upon becoming a member of the Cabinet in 1938. Until his 50th birthday Sir John had been a Civil Servant in the home departments. It was then that he went to India as Governor of Bengal, in which capacity he distinguished himself by displaying tact and firmness in times of unrest. A former Chancellor of the Exchequer, Sir John's economic and scientific interests should prove a valuable asset to I.C.I.



Sir John Anderson

MR. H. L. JOHNSON, a managing director of Courtaulds, Ltd., has resigned owing to ill-health. He will, however, retain his seat on the board. The company has appointed MR. C. W. SHELDON as a director (he was the secretary for some years), and MR. H. L. LIGHT as secretary.

Wills

MR. SAMUEL COURTAULD, chairman for 25 years of Courtauld's, Ltd., left £1,030,126, "so far as can be at present ascertained."

MR. P. PARRISH, of Blackheath, manager of the South Metropolitan Gas Company's chemical works at East Greenwich (and a contributor to THE CHEMICAL AGE) left £47,263.

Obituary

The death has occurred at a nursing home of MR. JAMES HENRY DAVIE, who joined the firm of Paul & Alexander 61 years ago, and in 1896 became manager of Paul & MacLeod, Gordon Street, Glasgow, of which he became a partner of Mr. George A. Paul in 1939.

MR. THOMAS ANTHONY BELL, 40, chief chemist at Marchon Chemical Co.'s works, Whitehaven, Cumberland, was killed at Bigrigg, near Whitehaven, on January 10, when the car in which he was travelling skidded at an ice-covered bend and collided with a stationary lorry. Two of his assistants, MR. W. C. HAMSHERE, of Drigg, and MR W. H. HUSBAND, of Calder Bridge, were taken to hospital with multiple injuries.

Technical Publications

A SUBJECT of topical interest to British food chemists, particularly in these days of extensive rationing, is the conservation of shortening fat in cooking processes. In this connection, a considerable saving has been effected in the U.S.A. by the use of glyceryl monostearate (Aldo 33), an edible modification of certain natural fats, which was given prominence at the Chemical Industries Exposition. It is said to have the additional property of conserving large amounts of flour by retarding staling of bread and other baked goods. A booklet which outlines the purpose, functions and uses of Aldo 33, published by the manufacturers—Glyco Products Co., Inc., Brooklyn 2, N.Y., merits attention.

* * *

The most recent addition to the useful series of information bulletins issued periodically by the Aluminium Development Association is entitled "Surface Finishing of Aluminium and its Alloys." Metallurgical chemists will find a good deal of new material on up-to-date methods in the four recognised categories of finish, viz: mechanical processes, chemical processes, electroplating, and paint finishes in this 43-page booklet from the A.D.A., 33 Grosvenor Street, W.1, price 1s.

* * *

The phenomenon of creep deterioration, a characteristic of carbon steel associated with differences in the amounts of aluminium and silicon added as de-oxidisers, forms the subject of *Alloy Metals Review*, 5, 46, December, 1947, published by High Speed Metal Alloys, Ltd., Widnes. Under the title "Abnormal Creep in Carbon Steel," Mr. J. Glen fully describes a series of tests which he supports with graphs and tables. A useful work of reference.

* * *

The determination of the rubber content of manufactured rubber-like materials is often not easily attainable. Chief among the obstacles encountered is the widely differing nature of the various fibres of the material. The rubber, too, may be vulcanised or unvulcanised. Other substances such as oils, fats and dyes, all contribute to an analyst's worries. Further light on the technique is provided by "The Estimation of Small Percentages of Rubber in Fibrous Materials," a booklet of which Mr. C. M. Blow is the author, and the British Rubber Development Board the publishers. Three techniques are laid down and described for the benefit of chemists.

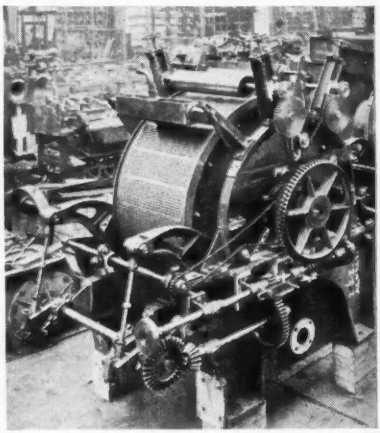
* * *

Among publishers of technical and scientific books, the Reinhold Publishing Corporation, New York (U.K. agents Chapman & Hall, Ltd.) enjoys a privileged position—it controls the issue of volumes appearing under the auspices of the American Chemical Society. In this connection, Reinhold's 51-page catalogue for 1948—"Let's Look it Up"—can be regarded as exceptionally valuable both to librarian and chemist.

* * *

An association that will have played an important rôle in preparing many a works manager's career, is the Works Management Association, or to give it its more recent, and perhaps more appropriate title, the Institution of Works' Managers. A booklet describing the functions, aims and achievements of this body is now available from its offices at 2 Caxton Street, S.W.1. The Institution's objects—"To increase the efficiency of British industry by raising the standard of works management practice among men engaged in, or about to be engaged in, works management in different industries and trades."

Standard Vacuum Filter



This open-type vacuum filter by International Combustion, Ltd., is a standard machine applied to filtering operations in chemical, metallurgical, paper and mining industries. Through a misplaced caption it was wrongly described in the article "Some Developments in Heavy Chemical Industry" (p. 45, January 10). It is fitted with press rolls and washing weir, and is shown here with the filter cloths removed

Home News Items

Another Scottish Factory.—British Electrometals, Ltd., of Leith, is about to open a new factory for metal finishing at Dens Road, Arbroath.

U.K. Coal Exports.—26,000 tons of British anthracite which have arrived at St. Johns, Newfoundland, represent the first shipment to arrive there for 18 months. An allocation of 20,000 tons of steam coal has been made to New Zealand for January and February.

New Cement Works.—The Ministry of Town and Country Planning has approved a £1,500,000 scheme for the construction of a large cement works by the Associated Portland Cement Manufacturers, at Westbury, Wilts.

Steel Ingot Record.—Guest, Keen Baldwin's steel men at East Moors Works, Cardiff, broke their own record by producing 13,264 tons of ingots for the week ended midnight January 3. The previous best was 11,933 tons in the week ended July 6, 1946.

Industrial Plan for Dundee.—The manufacture of starch, dyestuffs, bottles and boxes in Dundee is recommended by the latest planning report, issued by Mr. Gordon Payne, the East Central Scotland consultant. There is also need for an industry to absorb the waste jute which cannot be respun into yarn.

F.B.I. Packaging Committee.—F.B.I's Overseas Policy Committee has set up a special committee on packaging under the chairmanship of Mr. John Ryan, vice-chairman of the Metal Box Co., Ltd. The committee's rôle is to minimise packaging difficulties likely to arise in industry from the Government's all-out export drive.

North-West I.C.E. Meeting.—The North-Western branch of the Institution of Chemical Engineers will hold its annual general meeting at the College of Technology, Manchester, at 2 p.m. on February 6. Following the business meeting, Dr. D. T. A. Townend will present a paper on "Coal Utilisation." The annual dinner will be held at the Grand Hotel the same evening.

Iron and Steel Census Resumed.—The Ministry of Supply announces a resumption of the iron and steel census scheme, which operated in wartime at six-monthly intervals. Changed demands by consuming interests, and the forthcoming revision of the Iron and Steel Distribution Scheme, has caused the Government to resume the census. Forms already in the hands of some 18,000 steel-using firms are intended to facilitate improved distribution.

Textile Institute Membership.—Membership of the Textile Institute at January 1, 1948 was 3723, more than double that on January 1, 1945, 694 new members were enrolled in 1947.

Postal Registrations—Germany.—Letters, letter packets and postcards for any place in Germany, whether intended for transmission by air mail or by service route, may now be registered.

Courtauld's Research.—Permission to use part of The Islet, Maidenhead Court, for research work has been granted to Courtaulds, Ltd., by the Maidenhead Town Council, with the stipulation that local amenities shall not be injured.

Polish Magnesium Chloride for U.K.—According to an official statement from Warsaw, the Polish steamer *Lech* sailed for London on January 9 with the first trial consignment of 50 tons of magnesium chloride. The ship also carried 200 tons of charcoal.

Change of Name.—The Aluminium Plant and Vessel Co. is taking steps to change its name to the "A.P.V. Co.," having been influenced by the fact that although aluminium is still one of the company's main materials, a large part of its products is now made from stainless steel, copper, etc.

Minister Visits I.C.I.—Mr. George Isaacs, paying a visit last week to the Billingham and Wilton factories of Imperial Chemical Industries, Ltd., addressed workers and staff and showed particular interest in the apprentices' training school, where 30 boys are receiving theoretical and practical training.

Employees Become Directors.—In a statement on the appointment as directors of five employees of Triplex Glass Co., Ltd., last week Sir Graham Cunningham said that industry needed the direction of men with practical experience, and it was upon that belief that the company's policy of electing employees to the board had always been founded.

Forthcoming Exhibitions.—The Gauge and Tool Makers' Association is sponsoring the trade exhibition of precision tools and gauges, measuring instruments, etc., to be held in the New Hall, Vincent Square, London, S.W.1, during January 26 to February 6. The Engineering and Industrial Equipment (Home and Export) Exhibition will be staged at the Royal Horticultural Hall, Vincent Square, for two weeks from March 10 to 24.

Overseas News Items

Sulphur Deposits in India.—Deposits of sulphur are reported to have been discovered in the Shahabad area of India.

Unilever's Far-East Projects.—Unilever, Ltd., it is reported, intends to build soap and margarine factories in Macassar, Celebes, and elsewhere in the Far East, to supply markets in East Asia.

High Philippine Copra Production.—Output of copra and coconut oil in the Philippines is stated to have reached over 921,000 tons in the first eleven months of last year, i.e., over twice the annual average for the period 1935-39.

Record U.S. Oil Output.—The U.S. petroleum industry in 1947, according to Mr. R. G. Dunlop, president of the Sun Oil Co., exceeded all previous records in production, refining and distribution of crude oil and its products.

Less Norwegian Whale Oil.—Interim reports from Norwegian floating factories state that so far there has been a 29 per cent reduction in the whale oil catch compared with last season. Production amounts to 86 barrels per catcher per day as against 121 in the previous season.

Chilean Chemicals and Fertilisers.—A Chilean company, Fabrica de Cemento de "El Melon," has announced its intention of establishing, at a cost of 100 million pesos, a new factory at Quintero for the manufacture of caustic soda, phosphatic fertilisers, plastics and insecticides.

German Scrap for U.K.—According to an agreement concluded last week between the Western Germany steel industry and the bizonal economic control authority, Britain is to receive 100,000 tons of German scrap iron in the first quarter of this year. The German import authorities are to be credited with £6 10s. per ton, which compares with the world market price of about £10 per ton.

50,000 for U.S. Atom Projects.—Mr. Carroll L. Wilson, manager of the Atomic Energy Commission, addressing University of California students said that about 50,000 persons in the U.S.A. are now engaged in atomic energy developments and the number is expected to increase steadily. Only about 5000 persons are employed directly by the commission while the remainder are on the payrolls of some 300 concerns with which the commission has contracts. These concerns range from mining companies producing strategic materials to manufacturing plants turning out equipment.

Egyptian Oil Discovery.—A new oil well discovered at the Anglo-Egyptian oilfields at Hurghada, on the Egyptian Red Sea coast, is expected to produce 250 tons daily.

Luminous Resin Sheeting. — Canadian chemists have produced a phosphorescent variety of acrylic resin sheeting which glows for some 12 hours in darkness after normal daylight exposure.

Czech Artificial Fats.—The largest Central European plant for the manufacture of fats by synthetic methods is to be erected in Bratislava, by the Czechoslovakian Government.

French Oil Co. Increases Capital.—To provide its share in the financing of the construction of the Iraq Petroleum Company's new pipe-line to the Eastern Mediterranean, the Cie. Francaise des Pétroles has increased its share capital to Frs. 5,222,000 million.

Egyptian Import Restrictions Lifted.—The Egyptian Government has lifted import restrictions on a variety of goods, including chemicals and pharmaceuticals, from Britain and the sterling area. Egyptian importers have still to obtain import licences. These, it is stated, may be easily obtained.

Oil Search Rewarded.—Five of the ten wells drilled so far in the Springhill oilfields, Chile, are reported to have revealed oil. The existence of oil deposits in the North of Chile also seems likely, and the Government has recently sent a mission to carry out exploration work in the Province of Antofagasta.

Nitrate Exports—Chile. — If estimated figures for exports of nitrate from Chile for December are realised, total exports for 1947 will amount to about 1,656,000 metric tons, which compares with 1,435,955 tons in 1946. Chile's 1948 programme provides for a 30 per cent increase, but is dependent upon the large-scale export of sub-products, particularly sulphate of soda and potash, for which certain special equipment is awaited.

Less Linseed from Argentina. — The Argentine Government, contemplating absorbing the country's entire production of oil-seeds into Argentine industry, has ordered an investigation of (a) zones most suitable for growing oil-seeds; (b) the modernisation of the extraction industry; (c) the setting up of factories in localities of oil-seed cultivation; (d) facilities for technical guidance and study of consumer markets for finished products and of manufacturing markets using Argentine materials.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

TREVAUNANCE HYDRAULIC TIN MINES, LTD., London, W. (M., 17/1/48.) December 12, series of £10,000 debentures, present issue £1000; general charge. *Nil. August 16, 1947.

COPPER & ALLOYS, LTD., West Bromwich. (M., 17/1/48.) December 17, £10,000 mortgage to A. A. Millichip, West Bromwich; charged on lands and premises known as Nelson Works, Greets Green, West Bromwich. *£80,000. July 16, 1947.

GEORGE ROYSTON & SON, LTD., Barnsley, chemical engineers. (M., 17/1/48.) December 9, mortgage, to Yorkshire Penny Bank Ltd., securing all moneys due or to become due to the Bank; charged on benefit of all contracts, etc.

GRAHAM TATFORD & CO., LTD., Portsmouth, manufacturing chemists. (M., 17/1/48.) December 17, £200 (not ex.) and £100 (not ex) further charges, to Lloyds Bank Ltd.; respectively charged on 1 Milford Road, and 31 Curtis Terrace, Portsmouth. *Nil. April 25, 1947.

Company News

The nominal capital of **Boiler Insulation & Chemical Co., Ltd.,** 50 Stamford Hill, London, N.16, has been increased beyond the registered capital of £1000, by £1000 in £1 "B" ordinary shares.

Dussek Bros. announces an increase in profits during the year ended October 31, 1947, from £33,437 (1945-46) to £67,969. A dividend of 22½ per cent is recommended on the ordinary shares as against 20 per cent in the previous year.

New Companies Registered

W. John Williams & Co., Ltd. (447,612).—Private company. Capital £1000. Manufacturers, exporters and importers of insecticides, chemicals, disinfectants, fumigants, etc. Solicitors: Harris, Chetham & Co., 6 Stratford Place, W.1.

Marlow Chemicals, Ltd. (447,527).—Private company. Capital £100. Manufacturers, refiners and preparers of all kinds of graded, cleansing and sterilising detergents, oils and oleaginous and saponaceous substances, etc. Subscribers: L. W. Fyson and Mrs. Dilys M. Rees-Jones. Registered office: 42 Pitts Road, Slough.

Porosan Detergents, Ltd. (447,418).—Private company. Capital £100. Makers of and wholesale and retail dealers in detergents, whether soap or soapless, candles, greases, tallows, oleaginous compounds and emulsions, chemicals, gases, disinfectants, etc. Directors: W. Engel, M. L. T. Bennett, and H. J. Wells. Reg. office: 103 Cannon Street, E.C.4.

Durham Raw Materials, Ltd. (447,488).—Private company. Capital £100,000. Producers, manufacturers and dealers in chemicals, chemical products, minerals, metals, ores, glass and refractory materials, etc. Directors: Sir L. C. Paton, J. F. E. Gilchrist, G. F. H. Cumming, N. Dawson, J. F. E. Ruffell, and R. L. F. Nye. Reg. office: 1-4 Great Tower Street, E.C.3.

Amber Chemical Industries, Ltd. (447,317). Private company. Capital £400,000. To acquire all or part of the share capital of Amber Chemical Co., Ltd., or any other similar company; to adopt an agreement with Egit Investment Trust, Ltd., and Gottfried L. W. K. Bruckmann and to carry on business of pharmaceutical, manufacturing and general chemists and druggists, etc. Solicitors: Godden Holme & Co., 5 Upper Belgrave Street, S.W.1.

Chemical and Allied Stocks and Shares

APART from renewed strength of British Funds and speculative buying of road transport shares, stock markets have been uncertain and industrial shares have lost ground in the absence of demand. Sentiment has tended to be influenced more by the present economic position than by the prospect of Marshall aid in a few months' time, and the latest steel allocation decision affected some sections. The fear that another increase in the price of coal is inevitable during the next few months also had an unsettling influence; such an increase would inevitably be followed by yet another rise in prices of a wide range of materials.

Shares of chemical and allied companies reflected the general trend in industrials, Imperial Chemical easing to 49s. 6d., while Monsanto Chemicals 5s. shares were 63s. 9d., B. Laporte 88s. 9d., and W. J. Bush 83s. 9d. Fisons continued to change hands

quite actively, but eased to 70s. Elsewhere, Hardman & Holden 5s. shares have strengthened to 31s. 6d. on talk of a higher dividend for the financial year ending next March. There was again a fair amount of activity in Boake Roberts 5s. shares, which changed hands around 33s. 9d. Dealings up to 72s. 6d. were recorded in Blythe Colour Works. Major & Co.'s 2s. shares changed hands around 3s. 3d., while in other directions, Greeff-Chemicals Holdings 5s. shares transferred up to 17s.

British Industrial Plastics 2s. shares at 9s. attracted profit-taking, although the increased dividend was in accordance with market expectations. British Xylonite came back to £7½, but in other directions, Glaxo strengthened to £24¼ in response to the chairman's statement regarding export trade progress and the news that further expansion of the business in new directions would be possible if the raising of more capital were permitted by the Capital Issues Committee.

Borax Consolidated, helped by hopes of a higher dividend, were steady at 55s. 7½d., but British Oxygen eased to 98s. 9d., and British Aluminium were 51s. 10½d. United Molasses came back to 52s., Distillers to 29s. 9d., and British Plaster Board to 26s. 1½d. Steadiness at 23s. 9d. was shown by British Glues and Chemicals 4s. ordinary shares.

Iron and steel were again easier, United Steel at 28s. 1½d., Dorman Long 28s. 10½d., Colvilles 29s. 9d., and Stewarts & Lloyds 57s. 9d. In other directions, Courtaulds eased to 43s. 1½d., and Dunlop Rubber to 75s. 9d., while Tube Investments changed hand slightly over £7. International Combustion came back to 52s. 6d., and Babcock & Wilcox to 71s. The prospect of improving coal exports, however, drew attention to Wm. Cory (103s.), and Lambert Bros. (93s. 3d.).

There was a sharp reaction in Boots Drug to 57s. 6d., Beechams deferred eased to 22s. 6d., and Sangers were 35s., but Griffiths Hughes firmed up to 39s. Triplex Glass receded to 31s., and General Refractories (25s. 6d.) moved slightly lower on balance.

Imperial Smelting have been steady at 22s. 6d., but despite the raising of the interim dividend from 20 per cent to 25 per cent. Zinc Corporation shares eased to £6¾. Oils moved erratically with Anglo-Iranian (£8½) inclined to be affected by international political news. British Borneo Petroleum shares rose to 40s. 3d. in response to current views as to the company's earnings. Shell old and new fluctuated prior to Thursday when the first call became due on the new shares.

British Chemical Prices

Market Reports

STEADY trade in chemicals has been reported during the week and the volume of export business has continued on a satisfactory scale. The home demand covers nearly all sections of the market and delivery specifications from the larger users are in substantial quantities. The firm undertone which has long characterised the industrial chemicals market remains in evidence and such price movements as have occurred have been to higher levels. White and red lead are in active request at the increased rates and formaldehyde is also in strong request. There is nothing of fresh interest to report in the coal-tar products market, where quotations remain firm. The demand for pitch both for home and export account is very good.

MANCHESTER.—Home trade inquiries for a wide range of chemical products have been reported on the Manchester market during the week and the recent advances in prices in a number of lines seem to have had no adverse effects on the extent of the buying interest. Shippers have also been in the market with offers of additional export business. There is a steady flow of delivery specifications against orders already on the manufacturers' books. Deliveries of most descriptions of fertilisers are going forward fairly satisfactorily, and a good absorption of supplies of most of the light and heavy coal-tar products has again been reported.

GLASGOW.—In the Scottish chemical market, normal business has now resumed after the New Year holidays. During the week business has been very heavy. Prices have advanced in numerous commodities, but there are still shortages of a number of chemicals. The export business experienced a satisfactory week, and trade has been very brisk. Due to the dollar shortage in other countries, demands for chemicals in the U.K. have been considerable. Contracts are now being renewed with customers and business in many ways looks like being very heavy in 1948.

Another Steel Record.—Despite the difficulties which beset the industry in 1947, and the stoppage caused by lack of coal and power during the early part of the year, the production of steel sheets at the Hawarden Bridge works of John Summers and Sons, Ltd., Shotton, broke all records. "This gratifying result," says the firm, "was achieved only by drawing heavily upon stocks of raw materials which are now depleted, and by the happy collaboration between management and employees who responded nobly to the country's appeal for greater production."

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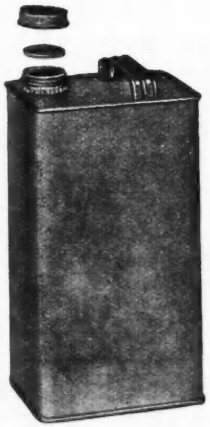
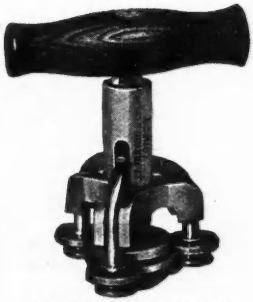


Square can showing patent screw neck. **Patent No. 382,380**



CAPSULING MACHINE
Patent No. 10699

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Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each.

Complete Specifications Open to Public Inspection

Oxidising fluid material and manufacture of catalysts therefor.—Carbide & Carbon Chemicals Corporation. Nov. 14, 1941. 16785/1944.

Preparation of products with Vitamin K activity soluble in water.—R. T. Chinion Gyogyszer es Vegyeszeti Termekek Gyara. March 19, 1940. 29721/1947.

Preparation of derivatives of steroid alcohols and for the utilisation of these derivatives in hormone syntheses.—R. T. Chinoin Gyogyszer es Vegyeszeti Termekek Byara and Z. Foldi. June 14, 1941. 29124/1947.

Preparation of degradation products of sterols.—R. T. Chinoin Gyogyszer es Vegyeszeti Termekek Gyara, and Z. Foldi. May 7, 1941. 29518/1947.

Polymerisation of organo-siloxanes.—Corning Glass Works. March 1, 1946. 6065-67/1947.

Benzene hexachloride and process of making it.—A. P. H. Dupire. Aug. 12, 1941. 4752/1947 (divided out of 586/1945).

Alloys for use at high temperatures.—Electro Metallurgical Co. May 9, 1946. 17854/1946.

Diazotype compositions containing N-acylamino phenol couplers.—General Aniline & Film Corporation. May 8, 1946. 8834/1947.

Compensating circuit for electrical instruments.—General Aniline & Film Corporation. May 7, 1946. 9328/1947.

Control of contrast in diazotype materials.—General Aniline & Film Corporation. May 13, 1946. 10264/1947.

Cooling apparatus.—General Aniline & Film Corporation. March 11, 1942. 29142/1947.

Resinous composition and method of making same.—General Tire & Rubber Co. May 6, 1946. 8981/1947.

Copolymerisation product and method of making same.—General Tire & Rubber Co. May 9, 1946. 9176/1947.

Dithiocarbamic acid derivatives and process of preparing the same.—B. F. Goodrich Co. Oct. 5, 1944. 28751/1947.

Synthetic rubber-like compositions.—B. F. Goodrich Co. June 20, 1940. 28978/1947.

Process for the production of substituted thiophanes.—Haco Ges. A.G. May 8, 1946. 13688/1947.

Process for the production of substituted thiophanes.—Haco Ges. A.G. May 8, 1946. 13689/1947.

Alloy anode for electrodeposition of zinc.—Hudson Bay Mining & Smelting Co., Ltd. Aug. 7, 1941. 29154/1947.

Water-insoluble polymers.—Interlake Chemical Corporation.—May 10, 1946. 12259/1947.

Thermochemically removing metal from oxidation resistant metals and alloys.—Linde Air Products Co. May 10, 1946. 11342/1947.

Method of and apparatus for working mineral materials, etc.—Linde Air Products Co. Dec. 3, 1940. 28934/1947.

Separation of DL-threonine and DL-allothreonine.—Merck & Co., Inc. May 10, 1946. 11538/1947.

Processes of improving the stability of an unstable solution of a reaction product of melamine, an aldehyde and a bisulphite, and the stable solution resulting therefrom.—Monsanto Chemical Co. May 7, 1946. 10707/1947.

Process for preparing 1.1.2-trichlorethane by the chlorination of 1.2-dichlorethane.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. May 6, 1946. 11163/1947.

Process for the preparation of unsaturated hydrocarbons from unsaturated aldehydes or ketones.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. May 11, 1946. 12673-74/1947.

Process for the production of halogenated hydrocarbons.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. May 13, 1946. 12828/1947.

Process for protecting metals against corrosion, anti-corrosive packing material and the manufacture thereof.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. May 7, 1946. 16387-90/1947.

Process for the purification of ketones.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. June 25, 1940. 28886/1947.

Separation of olefins from hydrocarbon mixtures.—Phillips Petroleum Co. April 25, 1946. 19891/1947.

New azo dyestuffs and processes for their preparation.—Soc. Anon. de Matieres Colorantes et Produits Chemique Francolor. May 14, 1946. 12850/1947.

Anodic treatment of aluminium and aluminium alloys.—Soc. Anon. Pour la Protection et la Coloration des Metaux, Trefileries et Laminoirs du Havre, and J. F. C. Herenguel. Sept. 22, 1944. 28692/1947.

Refining of lead.—Soc. Miniere et Metallurgique de Penarroya. May 7, 1946. 19166/1946.

Organic antimony compound and process of preparing same.—Sterling Drug Inc. May 4, 1946. 10969/1947.

Method of producing silica fibres and fibrous articles produced thereby. H. I. Thompson Co. May 11, 1946. 10970/1947.

Anodic oxidation of aluminium and its alloys.—Trefileries et Laminoirs du Havre. July 11, 1942. 28690/1947.

Anodic oxidation treatment of aluminium and its alloys.—Trefileries et Laminoirs du Havre and Soc. Anon. Pour la Protection et la Coloration des Metaux. Aug. 21, 1945. 28691/1947.

Coagulation of natural rubber latex.—Wingfoot Corporation. March 13, 1946. 24412/1946.

Preparation of esters of fumaric acid.—Wingfoot Corporation. March 13, 1946. 24413/1946.

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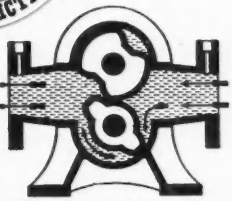

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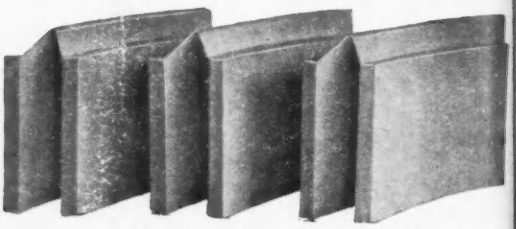

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